
**Texas A&M International University
A. R. Sanchez, Jr. School of Business
Center for the Study of Western Hemispheric Trade**

In Partnership with

**Universidad Autónoma de Tamaulipas
Facultad de Comercio, Administración y Ciencias Sociales**



**28th Annual
Western Hemispheric Trade Conference
April 10 - 12, 2024**

Conference Proceedings



About the Center

The Center for the Study of Western Hemispheric Trade at Texas A&M International University (TAMIU) is a public service institute founded to study globalization with a special emphasis on the Western Hemisphere. The Center is a part of the A. R. Sanchez, Jr. School of Business (ARSSB), and it supports the college as well as the entire Texas A&M International University community by organizing conferences, seminars, lecture series, and other public events, in addition to promoting research.

Ongoing activities of the Center include the IBC Bank & Commerce Bank Keynote Speaker Series, TAMIU's Annual Western Hemispheric Trade Conference, the regular publication of *The International Trade Journal*, the flagship and highly successful academic journal now in its 38th year of publication, and its online *Working Paper Series* which provides a forum for disseminating works-in-progress reflecting the broad range of research activities of TAMIU's faculty and students.

Mission

The Center has as its mission to study and promote research on globalization with special emphasis on the Western Hemisphere. The Center aims to increase awareness and knowledge about Western Hemispheric countries and their economical, political, and social interactions. The Center spotlights Texas A&M International University and the City of Laredo as key resources of information, research, training, and conferences focusing on the Western Hemisphere. Consistent with the mission of the School of Business, the Center promotes education and teaching through its various programs.



The CSWHT was created in 1995, and TAMIU's Western Hemispheric Trade Center opened its doors in September 2001.

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Moctezuma, Universidad del Noreste, A.C.; Wendy Pensado, Planta Petroquímica del Corredor
Industrial en el Sur de Tamaulipas; and Joaquín Guillén Rodríguez, Universidad del Noreste, A.C.

WELCOME

Dear Conference Participant:

Texas A&M International University's (TAMIU) A. R. Sanchez, Jr. School of Business (ARSSB) takes pride in welcoming you to its 28th Annual Western Hemispheric Trade Conference. The Conference is co-sponsored by the Center for the Study of Western Hemispheric Trade (CSWHT) in partnership with México's Universidad Autónoma de Tamaulipas (UAT) Facultad de Comercio, Administración y Ciencias Sociales. The Conference is being held April 10 - 12, 2024.

This year's Conference will be a combination of on-site and online activities. Please review the agenda and academic session schedule carefully. If a room number is assigned to a session/presentation (for example, STC 230), the activity will be held on-site at TAMIU and will be broadcast live via Microsoft Teams for our virtual participants. If the location is MS Teams, that session/presentation will be held completely online.

We are proud to present three outstanding keynote speakers: Felix Salmon, Author and Chief Financial Correspondent at Axios; Andrew I. Rudman, Public Policy Fellow at the Wilson Center; and Dr. Roberto Coronado, Senior Vice President in Charge and Senior Economist at the Federal Reserve Bank of Dallas, San Antonio and El Paso branches. We hope you will be able to attend their keynote addresses.

A total of 73 papers will be presented throughout 20 academic sessions. Participants in this year's Partial Least Squares (PLS) Applications Symposium are included in the academic sessions. The PLS Applications Symposium is chaired by Dr. Ned Kock, Regents Professor and Chair of the ARSSB's Division of International Business and Technology Studies.

We thank our corporate sponsors for their support: Commerce Bank and International Bank of Commerce.

We are pleased to welcome you as our guest and participant in this year's Conference and hope you have the opportunity to build professional contacts, find potential collaborators, receive helpful feedback on your work, as well as provide constructive commentary on the research being presented. The electronic proceedings for this Conference are available on our website: <http://freetrade.tamiu.edu/>.

Sincerely,



George R. G. Clarke, Ph.D.
Director, Center for the Study of Western Hemispheric Trade
Distinguished Professor of Economics and PNC Bank Chair
A. R. Sanchez, Jr. School of Business
Texas A&M International University

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CONFERENCE AGENDA

Wednesday, April 10, 2024

- 5:30 p.m. **Welcoming Reception** Student Center (STC) Ballroom
Sponsored by IBC Bank & Commerce Bank
- 6 p.m. **IBC Bank & Commerce Bank Keynote Speaker Series**..... STC Ballroom
MS Teams Location: <https://go.tamtu.edu/salmon>
- Introduction: George R. G. Clarke, Ph.D., Director, CSWHT, ARSSB, TAMTU
- The Phoenix Economy*
Felix Salmon, Author and Chief Financial Correspondent, Axios

Thursday, April 11, 2024

- 9 a.m. **On-Site Check-In Begins**..... STC Rotunda, 2nd Floor
- Continental Breakfast** STC Ballroom
- 10 a.m. **Concurrent Academic Sessions**
- Session 1: Issues in Economics, Finance, and Criminal Justice (Graduate & Undergraduate Student Presentations) STC 230
- Session 2: Finance and Economics STC 231
- Sesión 3: Manufactura y Producción STC 236
- Session 4: Strategy, Performance, and Risk MS Teams
- 11:45 a.m. **Break**
- 12 p.m. **Lunch Begins**..... STC Ballroom
- 12:30 p.m. **Luncheon Keynote Address** STC Ballroom
Sponsored by IBC Bank & Commerce Bank
MS Teams Location: <https://go.tamtu.edu/rudman>
- Welcoming Remarks: Pablo Arenaz, Ph.D., President, TAMTU
Introduction: George R. G. Clarke, Ph.D., Director, CSWHT, ARSSB, TAMTU
- México's Next President: Challenges and Recommendations*
Andrew I. Rudman, Public Policy Fellow, Wilson Center
- 1:45 p.m. **Break**

**All times listed are Central Daylight Time (CDT).
All on-site presentations will be broadcast live via MS Teams for our virtual participants.**

CONFERENCE AGENDA

Thursday, April 11, 2024 (cont.)

2 p.m. Concurrent Academic Sessions

Session 5: International Economics (Ph.D. Student Presentations)	STC 230
Session 6: Global Business Issues I	STC 231
Sesión 7: Temas de Educación	STC 236
Sesión 8: Temas Empresariales Globales	MS Teams

3:30 p.m. Break & Refreshments

3:45 p.m. Concurrent Academic Sessions

Session 9: PLSAS Innovative PLS-SEM Applications	STC 230
Session 10: Global Business Issues II	STC 231
Sesión 11: Liderazgo y Gestión de Recursos	STC 236
Session 12: Competitiveness and Technology Development (Graduate Student Presentations)	MS Teams

5:15 p.m. Break

5:30 p.m. Reception & Dinner

Sue and Radcliffe Killam Library (KLM), Front Lawn

Welcoming Remarks: George R. G. Clarke, Ph.D., Director, CSWHT, ARSSB, TAMIU

Friday, April 12, 2024

8:30 a.m. Concurrent Academic Sessions

Session 13: Issues in Innovation	MS Teams
Session 14: Geo-Economics, Global Carbon Markets, and Employment	MS Teams
Session 15: Reciprocity and Sustainability	MS Teams
Sesión 16: Educación y Sustentabilidad	MS Teams

10 a.m. Break

10:30 a.m. Concurrent Academic Sessions

Session 17: Issues in Economics, Trade, and Strategy	MS Teams
Session 18: Corporate Debt, Monetary Policy, and Victory Certificates	MS Teams
Sesión 19: Temas de Empleo, Desarrollo de Habilidades, y Educación	MS Teams
Sesión 20: Satisfacción del Consumidor y Temas de Producción	MS Teams

11:45 a.m. Break

(continued on next page)

CONFERENCE AGENDA

Friday, April 12, 2024 (cont.)

12 p.m. **Keynote Address**..... STC Ballroom
MS Teams Location: <https://go.tamui.edu/coronado>

Welcoming Remarks: Claudia E. San Miguel, Ph.D., Provost and Vice President
for Academic Affairs, TAMIU

Introduction: Amit Ghosh, Ph.D., Chair, Division of International Business &
Technology Studies, ARSSB, TAMIU

***Understanding the Evolving Economic Relationship between the
United States and México***

Roberto Coronado, Ph.D., Senior Vice President in Charge and Senior Economist,
Federal Reserve Bank of Dallas, San Antonio and El Paso branches

1:30 pm **Announcement of Student Awards & Closing Remarks** STC Ballroom
MS Teams Location: <https://go.tamui.edu/coronado>

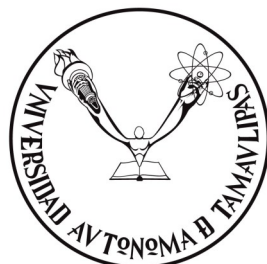
George R. G. Clarke, Ph.D., Director, CSWHT, ARSSB, TAMIU

End of Program

INSTITUTIONAL PARTNERS



A. R. SANCHEZ, JR. SCHOOL OF BUSINESS



VERDAD, BELLEZA, PROBIDAD

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ABOUT OUR SPEAKERS



Felix Salmon

Felix Salmon is the Chief Financial Correspondent at Axios, the host of the weekly Slate Money podcast, and author of *The Phoenix Economy: Work, Life, and Money in the New Not Normal*. He earned an MA in philosophy and art history from the University of Glasgow (Scotland) and has worked for noted economist Nouriel Roubini and outlets from Reuters to Condé Nast. He has won every major business journalism prize, including the American Statistical Association's Excellence in Statistical Reporting Award. He lives in New York City.

The Phoenix Economy

Keynote Address | Wednesday, April 10, 2024 | 6 p.m. CDT

Student Center Ballroom | Live Broadcast available at <https://go.tamtu.edu/salmon>

Sponsored by IBC Bank & Commerce Bank



ABOUT OUR SPEAKERS



Andrew I. Rudman

Andrew I. Rudman is a public policy fellow at the Wilson Center and former director of its México Institute. Before joining the Wilson Center, Rudman was Managing Director at Monarch Global Strategies (Monarch), a boutique strategic advisory firm located in Washington, D.C. and focusing on government relations and market entry/access for companies interested in doing business in México and other Latin American countries. He managed Monarch's healthcare practice and supported clients across a range of sectors and interests. He also writes and speaks on Mexican healthcare policy issues.

Prior to joining Monarch in 2014 (then known as ManattJones Global Strategies), Mr. Rudman was Deputy Vice-President for the Western Hemisphere at the Pharmaceutical Research and Manufacturers of America (PhRMA) (2007 to 2014) where he was responsible for developing and executing policy advocacy strategies for member companies across the hemisphere with particular focus on México and Brazil. He also covered Canada and Russia at various times during his tenure. Rudman began his professional career with the U.S. Government and served in the Department of State as a tenured Foreign Service Officer (1991 to 2001) followed by the Department of Commerce (2001 to 2006) where he was Director of the Office of NAFTA and Inter-American Affairs. His government and private sector experience allow him to provide guidance for development of government relations strategies especially for the healthcare industry including drug, device, and supplement manufacturers facing regulatory and market access/approval challenges.

Mr. Rudman has a master's degree in Latin American Studies from Tulane University and a bachelor's degree in Government and Spanish from Colby College. He is fluent in Spanish and has a working knowledge of Portuguese.

México's Next President: Challenges and Recommendations

Keynote Address | Thursday, April 11, 2024 | 12:30 p.m. CDT

Student Center Ballroom | Live Broadcast available at <https://go.tamiu.edu/rudman>

Sponsored by IBC Bank & Commerce Bank



ABOUT OUR SPEAKERS



Roberto A. Coronado, Ph.D.

Roberto Coronado is senior vice president at the Federal Reserve Bank of Dallas with responsibility for the District's community development, law enforcement, economic education and government relations groups. He also leads the Dallas Fed's San Antonio and El Paso branches, and shares oversight of the District's community engagement function.

Dr. Coronado is a senior economist and member of the regional group of the Bank's Research Department. In that capacity, he provides regional input into the Dallas Fed's monetary policy process and is responsible for monitoring and tracking economic and business activity in West, Central, and South Texas as well as southern New Mexico.

His research focuses on issues pertaining to the Mexican economy, U.S.-México economic integration, and border issues. Coronado has written articles for various Federal Reserve publications and academic journals in both the United States and México.

Dr. Coronado serves as a director for the Texas Lyceum and as a board member for the National Association for Business Economics, Texas 2036, and El Paso Collaborative for Academic Excellence.

He earned his PhD in economics from the University of Houston and holds a BBA in accounting and economics, and an MS in economics from The University of Texas at El Paso.

Understanding the Evolving Economic Relationship between the United States and México

Keynote Address | Friday, April 12, 2024 | 12:30 p.m. CDT

Student Center Ballroom | Live Broadcast available at <https://go.tamui.edu/coronado>



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CONFERENCE COMMITTEE

Program Chair

George R. G. Clarke, Ph.D., TAMIU

Program Committee

Amy Palacios, TAMIU

Jorge O. Brusa, Ph.D., TAMIU | Yong Chen, Ph.D., TAMIU

Balaji Janamanchi, Ph.D., TAMIU | Ned Kock, Ph.D., TAMIU

Leonel Prieto, Ph.D., TAMIU | Antonio J. Rodríguez, Ph.D., TAMIU

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Economic Approval and Corporate Investment: The Invisible Hand?

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Abstract

Utilizing the novel presidential economic approval rating (PEAR) index, this study isolates unexplained sentiment from traditional macroeconomic factors and assesses its impact on capital investment. The study documents a strong negative relationship between firm-level capital investment growth and unexplained public opinion regarding the government's economic performance. Notably, periods of high unexplained sentiment about the economy coincide with reduced growth in capital investment, with the magnitude of this effect varying across different investment growth levels. Moreover, the effect is less pronounced for firms facing less investment frictions, benefiting from investment credits, or serving government clients. In contrast, it intensifies for firms with corporate clients, those in politically sensitive or high litigation risk sectors, and during geopolitical tensions. The findings offer empirical evidence supporting the idea that "true" public sentiment has the potential to impede the costly and irreversible corporate investment induced by precautionary delays.

Keywords: Economic approval; Presidential economic approval rating; Presidential job approval rating; Corporate investment

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Factors Affecting Portfolio Investments

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Abstract

The purpose of this research paper is to analyze and discover the various kinds of factors that affect a typical investor who has an investment portfolio in the United States. The portfolio would be mostly comprised of the more common securities such as stocks, bonds, mutual funds, and ETFs. With the aim of the research paper falling under the study of finance and having put core financial principles into account, it must be stated that there is also qualitative and quantitative research put forth to ensure an objective approach to the academic question at hand. Although this is not a new question to the field of finance, it nevertheless does always have new data being put in as the stock market is an ever-evolving source of the latest information that continues to be cultivated throughout the years. One of the main goals of this research paper is to have a new investor be able to leave with new knowledge on what can affect their decisions based on certain elements and scenarios. Additionally, a rationale behind the research paper is the fact that a majority of investors are unaware of the inner workings of certain factors having an influence on their decisions no matter on the importance or size of that investment decision. As mentioned before, this is not a new topic, but new modern perspectives will be put as the U.S market does react differently to domestic and international events. To help bring to light the goal of this paper, the primary method was online research alongside analysis to bring a new perspective on the theories and trends that would be talked about throughout the paper. Of course, with it being a financially oriented paper, quantitative data is import and will be present as it commands a respectable amount to the academic question at hand. As is most research for this question, qualitative data will also be present in sizeable amounts as a portion of the decisions trends tend to have some sort of emotional or psychological aspect to it. In continuation, the findings as compared to the initial hypothesis stood to a certain degree as the results came to show that emotional and behavioral finance has a key role to play when it comes to making asset allocations in the investment portfolio. As well as reprovng and interpreting formulas that play a crucial role in portfolio management can be linked back to as a factor that affects the final decisions for the typical investor. Overall, the significance of the research paper is to further reinforce the theories on different disciplines in the study of finance, some of which are behavioral finance, modern portfolio theory, and international finance. Alongside the implication of enlightening the unknowing and providing an informative paper on a rather complex and ever-changing topic that never ceases to produce new conversations.

I. Introduction

In the world of investing and managing portfolios, there are endless opportunities and successes to be won through a thoroughly diversified portfolio. As it pertains, to the definition of an investment portfolio, corporate finance institute states "...is a set of financial assets owned by an investor that may include bonds, stocks, currencies, cash and cash equivalents, and commodities."² This will be used as the primarily reference definition when talking about investment portfolios. These factors will be affecting all aspects and financial assets, mainly stocks, as those will be the most common amongst a typical investor. Furthermore, a portfolio can be mainly used as a form of passive investing for an investor who wants to have a secure

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² <https://corporatefinanceinstitute.com/resources/career-map/sell-side/capital-markets/investment-portfolio/>

retirement fund. Contrarily, there is also a method of management that is called active management which has a much more firsthand approach when it comes to the activities of the portfolio. Additionally, a portfolio investment is a fantastic way to save money in a sense to avoid it from depreciation and losing its buying power over the years. In comparison to having it in a regular saving account or even in cash under a mattress, a popular time test method to saving money. Nevertheless, when it comes to investing in the stock market and to that extent having an investment portfolio, there are several factors to consider when investing in any capacity from psychological to more quantitative additions which may have some sort of impact on the outcome of said financial goal. To further continue, the paper will be covering a variety of factors and elements that can have a significant impact on an investment portfolio. These will be served at all levels of the investing process from the very beginning in the research phase to the actual outcome and expected returns of the assets at hand.

II. Behavioral Factor

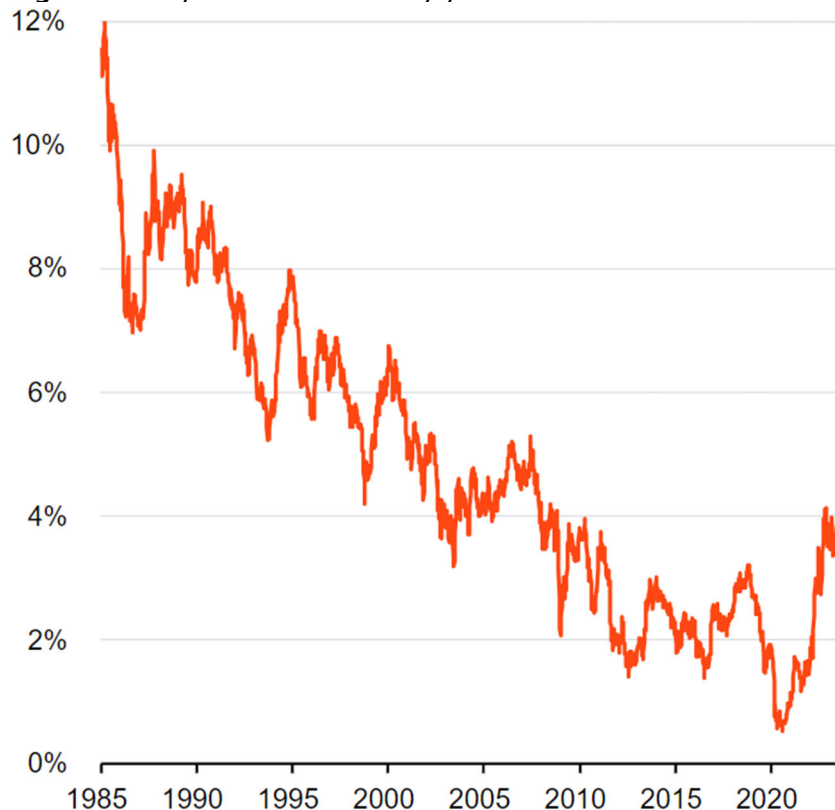
To begin with, the typical investor and their behavioral factors can be an important aspect of how well the portfolio will do. The net gains or losses can vary heavily in either direction as one of the main theories behind this is the risk tolerance of the investor. As is normal for any kind of person, the risk tolerance of the investor will mainly depend on age, end goal, and stock stability. The average use of risk for a portfolio, for example, for a younger investor will be mainly of stocks and ETFs that can provide a rather aggressive approach to returns if necessary. Since stocks are one of the more riskier assets to invest in, the theory holds for younger people to be more risk adverse. Risk adverse is defined as the ability to take on more risk so long as the return is comparable to the higher inherent risk. On the contrary, as the investor gets older there is a noticeable change in investment consciousness that makes it a more secure, stable portfolio with more bonds, treasury bills, notes and alike. This comes to no surprise as older investors will generally be classified as a more risk avoidance decision maker. There are a variety of reasons for this, one of which is the older investor will most likely be retiring soon meaning that there will be a lower income inflow for the portfolio. This in turn will cause the investor to have a more conservative approach to their portfolio to ensure a more secure and stable investment. Moreover, the other behavioral theories about investing can be such as the overconfidence in an investor. Ferreria - Schenk et. al made a fantastic statement regarding overconfidence "...it can be suggested that overconfident investors are likely to omit new public information in their investment decisions, which can cause these investors to invest in the long-term and ignore short-term volatility" (2023). To provide more insight into the statement, overconfidence makes it so that the investor inherently understands that the stock market will increase in the long-term having little to no regard for short term volatility. Long term investing tends to be the more common avenue for typical investors as it is seen as the more accessible strategy. Now this does not come without its consequences as overconfidence can lead to distinct levels of manipulation of the market in their portfolios since the investor would not take meaningful action on any present-day news. Now another qualitative factor that needs to be examined is the risk perception of an investor that can be influenced by herd bias. Herd bias is defined by the collective action of a group that affects and influences the thinking of an individual. This is present especially in the investor world. When it comes to investing the herding bias can be extraordinarily strong as the investor will rationalize that if everyone else is buying per say the same stock then they must also buy it instead of doing independent research. The herding bias can have a profound effect on an investment portfolio.

III. Market Outlook Factor

Also, it is important to note that the market is an essential factor to consider when it comes to the outcome of an investment portfolio. Since this is where the primary information comes from and is where all the transactions occur daily, it is no surprise that any major changes here come

to show in any portfolio. To display this point, BlackRock Incorporated, an investment advisement, consulting firm, points to a good observation in which they talk about how the United States Market is recovering after the year 2020 in which the market seemed to have been steadily falling since the mid 80's. This graph specifically refers to the United States 10-year return on Treasury yields. Adding to the graph, the relevancy of treasury yields to an investment portfolio is that the treasury yields give great insight into the health of a portfolio. The relationship between treasury yields and the stock market is inverse which means that when the yield is up the stock market tends to be down or in a bearish market. This kind of inverse relationship is crucial to know, especially when considering the modern-day stock market activities.

Figure 1: 10-year return treasury yields.



Now, with the overall downturn that occurred during 2020 because of the COVID -19 pandemic, an obvious rise was in place as it common after a recession. But it would be noting worthy to an investor on the pushers that prompted such a rapid comeback from the market that made it go back to levels even before the 2008 housing recession. To restate, the graph shown above is based on the 10-year treasury yields for the United States. That means that investors have a sense of confidence from the government that the market will recover, and this ends up causing a sort of cycle that prompts the market into a bullish market. To a keen investor, the government incentives would cause a second look into certain kinds of securities, especially that of medical and consumer staples. Especially since of the biggest moves for the government to stimulate the economy was to have stimulation checks which were at their very basis a way to cause people to spend more to move the economy during 2020. The effects could be seen in the following years as the U.S market and economy started to respond to the increased spending.

IV. Asset Allocation Factors

To continue on a qualitative basis, putting the securities into a portfolio also means understanding how well these kinds of assets react with each other. Alongside this is the allocation part which essentially means where exactly the investment is going to. To further clarify, there are several different assets that an investor might choose depending on the end goal. There are stocks, bonds, mutual funds, ETFs, and cash all of which have a certain kind of inherent risk with a potential profit depending on certain circumstances. To begin with, stocks are the most common and make up most of the general allocation for an investment portfolio, with the major difference being that there are different sectors that distinguish it from the rest. Sectors in this case are a major factor to consider for an investor who is looking to invest. For example, for a young investor it would be advisable to invest in a cyclical sector which can include industries such as Information Technology, Consumer Discretionary, and Communication Services. This tends to carry a higher risk with a more lucrative return on investment should it be managed correctly. On the other hand, for an older close to retirement investor, an allocation of defensive stocks which are stable and not so volatile would be preferable. These defensive stocks are not limited to health care, utilities, and consumer staples such as food and drug companies. Continuing, bonds also are assets that are divided into several diverse kinds of bonds, the most common being government and corporate. Under government, there are treasury bonds which have different maturity rates which are often suggested for soon to retire investors looking for a way to have a secure line of stability. Corporate bonds, also known as commercial paper, often carry more risk with a higher return interest rate yet are not always recommended as they tend to have too much risk for a typical investor who is risk adverse. Mutual fund and ETFs, electronically traded funds, both have similar principles in which funds are pooled together such as a series of stocks and/or bonds of similar sectors which then are managed by financial institutions. Investors can then purchase a slice of these funds and have them added to the investment portfolio. As it pertains to how this factor is influential, there are things to note. The main one is how the investor plans to manage the portfolio itself. One of the two ways can be passive management, which involves minimal maintenance with long term goals in mind. It tends to be called a hands-free approach as there is not much trading involved as its counterpart. Active management of the portfolio involves a significant amount more trading and can be a big gain for short-term investors. This rather small factor for investors can change the trajectory of the portfolio and its overall goal in either the short or long term.

V. Quantitative Factors

In the world of investment portfolios, investing is as much rational and logical thinking as it is mathematical and quantitative. There is a certain topic that is often overlooked when it comes to investment factors and that is the mathematical risk involved in a portfolio. This risk can be called variance which is defined as the "...to a statistical measurement of the spread between numbers in a data set."³ Investopedia states it simply and thoroughly in which using that definition will be using it to further understand portfolio variance. Under portfolio variance, there are three separate statistical ideas to get through. When it comes to an investment portfolio's assets there are the weights of each asset to consider as this will be consequential in the future. In essence, the weight is the percentage of which the asset makes up in the investment portfolio. It can range in any direction with the greater number of assets being that there will be less weight on each security. While it can be argued that there are several distinct kinds of weights for securities such as price, value, and unweighted. For the sake of the explanation and simplicity, the definition of the weights will be that of the percentage of value for which it makes up in an investment portfolio. To continue, the other is portfolio variance itself which has the symbol, σ^2 , sigma squared has an especially significant role in determining the overall risk for a portfolio. Lastly, there is the security covariance which is used when there are multiple securities in the same

³ <https://www.investopedia.com/terms/v/variance.asp>

portfolio. This will help determine the pairing of each separate security with the other security giving an equal amount of potential risk for each pairing. Staying on this relevant topic, understanding that the standard deviation, σ , is just the square root of the variance. Furthermore, it was explained earlier that the standard deviation of security would be the volatility of the security. In other words, it would be how often it changes in price throughout a period.

For an investor, it can be beneficial and influential to have a rough calculation of the potential return of the total portfolio. Where the equation states that the percentage of the weight of the asset in the portfolio times that of the expected rate of return for the asset.

Figure 2: Expected returns for portfolio formula.

$$E(R_{\text{port}}) = \sum_{i=1}^n W_i E(R_i)$$

This formula gives a knowledgeable investor the ability to give an educated guess on what the potential can be for the portfolio on hand. This can directly lead to the following point which is that of the theory of the effective frontier. In basis it is when the rate of return is at its maximum at its given level of risk from the lowest to the highest. This turns out to be more useful in portfolio investment situations. In turn, this theory shows cases where there is a certain point to which a portfolio is deemed the most effective given its risk or standard deviation of return. Additionally, to the extent of the effective frontier it has a unique approach that is both qualitative and quantitative in certain aspects. An instance would be how risk adverse an investor is when confronted with quantitative data showing the overall risk of an investment, or in the case of a portfolio, the several investments. If the data shows that the risk is on the lower end of the effective frontier, the investor might see this as reasonable enough to continue with the investment, yet if the investor already has a financial goal that does not align with the portfolio, then no matter how efficient the investment portfolio is then there is no reason to continue with the investments.

VI. International Investing Factors






Continuing along the line of quantitative factors. The math does point to a rather interesting strategy that can have heavy influence on investors who favor a more quantitative approach to investing. Moreover, a quantitative approach for some investors can be seen as more dependable and can be compared to a fundamental analysis. Since a fundamental analysis is mainly based on numbers and previous historical data. With that being said, international assets and their partners offer a great deal of diversification for a typical investor who wants to evenly distribute risk in the investment portfolio. Although data has shown that an international asset such as a security or a bond does tend to carry more inherit risk along a similar timeline as its domestic counterpart, there is a solution that offers a viable compromise to this dilemma.

Figure 3: Correlation Coefficient formula.

$$\rho_{xy} = \frac{\text{Cov}(x, y)}{\sigma_x \sigma_y}$$

It⁴ involves formulating the covariance of both stocks which is then divided by the product of the standard deviation of both stocks as well. The resulting number from this formula can be interpreted in one particular way in which the number will either be from -1 to 1 or depending on the solution will be different analysis. In general, the closer the answer is to a positive 1 then the more correlated the stocks are with each other hence they will move virtually in unison. Additionally, if it is down to a zero there is no correlation which means both stocks will not move in a similar direction and do not seem to influence each other. Lastly, and more notably, an answer closer to a negative 1 correlation means that either stock will move inversely to each other. A notable detail that will be further discussed. Knowing the correlation coefficient in an investment portfolio has a multitude of benefits, one of which is seeing the coefficient between international stocks and domestic stocks. With the tendency of international stocks having a higher risk aspect, it can be said that pairing it with a domestic stock that has a relatively low risk rate i.e. a defensive or non-volatile stock will help lower the overall risk of the investment portfolio both stocks are in while still maintaining the advantage of having a highly diversified portfolio. This sort of low correlation coefficient has been proven mathematically with actual results to back up the data. Moreover, a common trend among those investors who are familiar with international markets state that a portfolio split of seventy to thirty percent of domestic and international stocks respectively is one of the more ideal combinations for a good possible portfolio. Vanguard has a fantastic statement to add to this theory "...We expect that the return patterns between domestic and international equities will continue to differ regardless of where an investor lives, leading to a continued benefit from diversification."⁵ To add onto the point made, to have a benefit stem from diversification, there must be a low correlation number between the assets at hand. Vanguard also did provide a great table that highlights this point exactly. With the calculations done for a predicted 30-year correlation between domestic and international countries the results do favor the theory as a whole.

Figure 4: 30-year correlation for countries.

Country/region	30-year correlation
 Australia	0.62
 Canada	0.64
 United Kingdom	0.65
 United States	0.72
 Euro area	0.76

Note: Correlations are for domestic equities to each country/region's international equity market.

To further explain the table, the markets need to be imperfect for the correlation. What is called a perfect correlation is a 1, so that means that these countries, although close are not close enough to be considered perfect and are considered imperfect. As it pertains to the investor, having this kind of data available to digest and process is crucial as this could be the key to having a very well diversified portfolio.

⁴ <https://www.investopedia.com/terms/c/correlationcoefficient.asp>

⁵ https://corporate.vanguard.com/content/dam/corp/research/pdf/Global-equity-investing-The-benefits-of-diversification-and-sizing-your-allocation-US-ISGGE042021_Online.pdf

VII. Conclusion

The results from analyzing various kinds of sources concluded that there is in fact a multitude of numerous factors that can influence an investment portfolio. More specifically, from a psychological standpoint there are instances where external events and ideologies can cause investors to turn to a specific investment goal. All the while, that same investor can see a more concrete and quantitative process that again can lead that investor into investing appropriately given the math-based rationale. Overall, the research paper was made with a distinct goal in mind and has successfully been able to answer the academic question.

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Understanding the Influence of Officer Education Levels and Body-Worn Cameras on Citizen Complaints: A Zero-Inflated Binomial Regression Analysis

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Abstract

Violent events involving law enforcement officers in the 2010s and 2020s have increased scrutiny of law enforcement agencies. Body-worn cameras (BWCs) have become more prevalent in the past ten years, partly because of these events. Within this context, a recommendation to increase the number of college-educated police officers has also increased. Three successive Presidential Commissions on law enforcement have recommended increasing the number of college-educated police officers and millions of dollars in federal grant money have been disbursed to fund the acquisition of BWCs. The federal government is actively working to provide solutions and recommendations to build community trust and legitimacy in law enforcement. As BWCs become a ubiquitous law enforcement tool and the number of individuals with college degrees increases, it is critical to understand the impact on citizens. Using the latest results from the 2020 Law Enforcement Management and Administrative Statistics (LEMAS), these issues are explored and policy implications are discussed. Using negative binomial regression, this study found that BWCs, education requirements, and education-based incentives do not reduce citizen complaints. However, there are benefits found within the literature that justify the continued pursuit of higher education and the acquisition of BWCs.

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Overlapping Institutional Ownership and Supplier Firm Risk-Taking Behavior

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Abstract

In this study, I examine the relationship between overlapping institutional ownership and the risk-taking behavior of suppliers. I find that investor overlap has a positive relationship with suppliers' risk-taking. In addition, I find that reduction in holdup costs is one of the channels through which investor overlap influences the risk-taking of suppliers. Moreover, I find that both suppliers with major customers and those without major customers increase risk-taking, indicating that investor overlap reduces customer concentration risk. Furthermore, I find that suppliers in their introduction and growth stages, as well as those without financial distress, take more risks. Finally, the results indicate that product market threats and asset redeployability positively moderate the relationship between overlapping institutional ownership and the risk-taking behavior of supplier firms. The results are robust to alternative proxies and estimation techniques.

Keywords: Overlapping institutional ownership; risk-taking; supply chain

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Variance Risk Premium, Credit Derivatives Index, and the Twin Financial Crises

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Abstract

This paper comprehensively investigates the relationship between the variance risk premium, defined as the difference between the implied and realized volatilities, and the observed cross-market informational flow between the systemic credit derivatives and equity markets. Recent studies published at leading finance journals have provided empirical evidence showing that the variance risk premium, or the volatility of volatility, helps forecast the aggregate market equity premium at the monthly and quarterly frequencies in the framework of univariate predictive regressions. However, to the best of our knowledge, there is a lack of works systematically examining the linkage between the variance risk premium and the cross-market informational flow between credit and equity markets. Our empirical results formally establish the linkage between the variance risk premium and the cross-market informational flow, in terms of statistical significance and predictive content. We then take a dynamic perspective by looking at how the newly discovered association evolves over time, particularly focusing on the recent twin economic crises, namely, the 2008 global financial meltdown and the 2020 COVID pandemic.

Keywords: Variance risk premium; market efficiency; CDS index; return predictability; financial crisis

JEL Classification: C32; C53; C58; G01; G14; G17

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Loan Only Credit Default Swaps and Bank Syndicated Loans

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Abstract

The purpose of this paper is to investigate how credit default swaps affect banks' risk sharing in syndicated loans. Loan syndication is one of the important tools for banks to share their risks with other banks. A new credit derivative product, loan only credit default swap, allows banks to transfer the credit risk of borrowers in an alternative way. Thus, we investigate an important question on whether loan syndication and the loan only credit default swap index (LCDX) are complementary or substitutive methods to share risk for lead banks. We find that lead banks retain more shares of a syndicated loan once the LCDX price increases. This finding indicates that lead banks use the loan syndication and credit derivatives to complement their risk. The results are robust to an instrumental variable analysis, propensity score matching, omitted variable bias, different sample specifications, and alternative measures.

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Climate Change Stringency Policy and Working Capital Management: Global Evidence

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Abstract

We document that climate change stringency policy positively correlates with the cash conversion cycle. Consistent with the firm's regulatory compliance and legitimacy theory, we argue that the increase in the cash conversion cycle results from firms' regulatory compliance to build acceptance of their products and services. Using a global panel dataset from 2008 to 2021 including fifty-four countries, we show that profit margins, cash flow, and cash holding are reduced by climate change stringency policies. Additionally, financially unconstrained firms, relative to constrained firms, have lengthened cash conversion cycles. Overall, the results are robust after using the components of the cash conversion cycle and climate change stringency, eliminating the global financial crisis and COVID-19 periods from the sample, and using an instrumental variable identification strategy to address endogeneity.

“Alongside major technological, demographic and political shifts, our very world is changing. Shifts in our climate bring potentially profound implications for insurers, financial stability, and the economy. Climate change is the Tragedy of the Horizon.

We don't need an army of actuaries to tell us that the catastrophic impacts of climate change will be felt beyond the traditional horizons of most actors – imposing a cost on future generations that the current generation has no direct incentive to fix”. Mark Carney, Former Governor of the Bank of England

Keywords: Climate change stringency policy (CCPI); cash conversion cycle (CCC); regulatory compliance; legitimacy

JEL Classification: G15; G32; G38; Q54

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The Real Economic Effects of Local Banking Market Structures: Evidence from US Counties

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Abstract

Do local banking market structure affect local unemployment rates? An answer to this question has important implications in understanding the real economic effects of banking market outcomes. Using a panel dataset covering more than 2700 counties from 1994-2020 we find more concentrated markets to be associated with lower unemployment rates. Exploring transmission mechanisms, we find a rise in concentration to increase different categories of bank lending, including small business loans. Higher concentration also leads to more new business formation and job creation. The empirical findings of this study lend support to the relative efficient structure paradigm that higher concentration in local banking markets results in the more efficient banks gaining market shares, increasing their comparative advantage in serving local markets, which in turn increases access to credit thereby benefiting local labor markets.

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Análisis de balanceo de líneas en la industria manufacturera en busca de la generación de utilidades

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Resumen

El balanceo de líneas es una técnica que puede llegar a lograr una eficiencia en la producción. En la siguiente investigación se elaborará un balanceo de una línea de producción buscando lograr una producción más optima de la establecida generando con esto una mayor utilidad. Se realizará un análisis del diagrama de recorridos (espaguete) aunado a la toma de tiempos de la línea de producción en busca de la optimización de esta. Con el diagrama espaguete obtenemos el diagrama de flujo que aporta las áreas de oportunidad, junto con la toma de tiempos que percibe los movimientos ineficientes podremos tomar decisiones en el camino de la optimización. Con el nuevo procedimiento de balanceo podremos lograr alcanzar mayores utilidades dentro de la empresa. Con ello podremos mostrar como el balanceo de línea podría convertirse en una opción para las demás empresas que buscan mayor utilidad.

Palabras clave: Balanceo de líneas; productividad; empresas de manufactura; utilidad

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Propuesta perspectivas al cuadro de mando integral a las IMMEX

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Resumen

Dentro de la Industria Manufacturera, Maquiladora y de Servicios de Exportación (IMMEX) un Cuadro de Mando Integral (CMI), también conocido Balanced Scorecard, permite funcionalidad y eficiencia en producción. Las IMMEX por su naturaleza, cuentan con una empresa en territorio nacional, dedica a la producción masiva, otra twin a la administración ubicada en el extranjero, por tal, la eficiencia de ambas se sustenta en CMI. Es una guía a las actividades productivas y administrativas.

De acuerdo con Robert Kaplan y David Norton, (2005), el CMI permite una visión empresarial y productiva a largo y mediano plazo, establece, organiza las metodologías y aplica las estrategias de cuatro elementos fundamentales los cuales son empleados, clientes, tecnología y finanzas, para nuestro caso se propone incluir la perspectiva de los proveedores y la perspectiva de sustentabilidad empresarial.

Palabras claves: Productividad; estrategia; fortaleza; IMMEX

Abstract

Within the Manufacturing, Maquiladora, and Export Services Industry (IMMEX), a Balanced Scorecard (CMI), also known as Balanced Scorecard, allows functionality and efficiency in production. The IMMEX, by their nature, have a company in national territory, dedicated to mass production, another twin to the administration located abroad, therefore, the efficiency of both is based on CMI. It is a guide to productive activities and administrative.

According to Robert Kaplan and David Norton (2005), the BSC allows a business and productive vision in the long and medium term, establishes, organizes the methodologies, and applies the strategies of four fundamental elements are employees, clients, technology, and finances, for our case is proposed to include suppliers and the perspective of business sustainability.

Keywords: Productivity; Strategy; Strength; IMMEX

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Modelo de arquitectura de referencia para la industria 4.0 y su impacto en la productividad de las empresas manufactureras de Nuevo Laredo

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Resumen

En Nuevo Laredo la industria manufacturera cumple un rol importante en desarrollo económico de la localidad, la incorporación de nuevas tecnologías en los procesos productivos aportaría un aumento significativo en la competitividad empresarial. En la presente investigación se buscará medir que tan asociadas se encuentran las variables del modelo de referencia RAMI 4.0 (Reference Architecture Model Industrie 4.0) con la productividad en las empresas manufactureras. Se buscará medir el nivel de relación por medio de una regresión múltiple, ya que contamos con cuatro variables dependientes que conforman el constructo denominado RAMI y una dependiente que es la productividad. En el análisis se aportará el nivel de Predicción que tiene cada una de las variables con respecto de la dependiente. Con esto se determinará las variables que debemos implementar primero en busca del aumento de la productividad en las empresas de manufactura, Encaminando a las nuevas empresas en el camino de la industria 4.0.

Palabras clave: RAMI; productividad; empresas de manufactura

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An Alternative View of Deglobalization: Multinational Corporate Strategy in the Hyper-Risk Age of Geopolitical Tribalism and Social Media Coercion

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I. Introduction

This paper begins by briefly summarizing traditional research on globalization multi-polarity theories, then describes an alternative view based on population growth demographics and recent trends related to the nationalistic deglobalization phenomenon. It is proposed herein that many of the current and expected countries / regions driving globalization, e.g., China, EU, among others, will not rise to positions that counterbalance the U.S. in a stable way (i.e., traditional multipolarity theories) in the next thirty to forty years. Instead, other regions of the world with higher net population growth rates will rise to form new and currently underrecognized hubs of economic gravity including a larger Western Hemisphere hub, the rise of India as the anchor of a restructured Asian nexus, and the potential emergence of Africa as a viable economic counterparty.

If true, this redefinition of global economic centers of power would not only cause profound changes in the current and expected world supply chains, financing arrangements, and sources of manufacturing, but this phenomenon is occurring during the rise of a nationalistic deglobalization trend that will further change international trade agreements – e.g., tariff structures, favored nation policies, etc. – and will also create strong incentives and disincentives on individual companies not just in what countries they choose to operate in but what countries they are forced to subordinate or even exit.

These two changes alone – the re-shifting of regional economic power and the rise of nationalistic deregulation – will significantly increase the level of risk faced by multinational corporations, but these trends are also occurring during the unprecedented rise of stakeholder activism and corporate coercion enabled by the adoption of social media and the rise of computer trading algorithms. The ability to create massive shifts in stock value nearly instantaneously based on hearsay, innuendo, or planned online campaigns is a massive new risk faced by corporations only within the last twenty-five or so years.

When combined, at no time in modern history have multinational corporations faced the type of hyper-risk and chaotic environment that is arising across the global community. It is vital that strategic management practitioners and academicians recognize this new confluence of risks and find ways to not only survive but capitalize on this long-term macro political economic tsunami. This paper is focused on identifying and summarizing the key drivers of this emerging global gestalt before offering an initial set of proposals on how multinational corporations are likely to manage this assault in the next decade and beyond.

II. Context from Existing Literature on Globalization, Multi-Polarity, and Deglobalization

This brief summary is meant to provide a foundational background on globalization literature on which a discussion of recent trends can be based and have greater context. The recent trends are then used to explore implications to multinational corporate strategy in a hypersensitive stakeholder world.

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2.1 Globalization & Multi-Polarity

For well over thirty years, the concept of globalization has been explored at great length across multiple disciplines from economics to political science to sociology and beyond; thus, its definition has been hotly contested for decades (Robertson and White, 2007). However, because this paper focuses on business applications, we will use a well-established definition that is often taught to students of strategy, “Globalization is the increasing economic interdependence among countries and organizations as reflected in the flow of products, financial capital, and knowledge across country borders” (Hitt, *et al.*, 2019, p. 10).

Of the various streams of research regarding globalization, the construct of an emerging multipolar world has become one of the most well recognized. The principles of the multipolarity theory originally rose to prominence in the mid-1960s within the context of the Cold War between the U.S. and Soviet Union (Deutsch and Singer, 1964; Rosecrance, 1966). This concept has since evolved such that a widely accepted future scenario now involves the rise of an Eastern versus Western (mostly China versus the U.S.) bipolar equilibrium, with a potential second scenario including the rise of Europe as a third pillar (Crespo and Zuzuárregui, 2020).

For example, from a more mainstream practitioner perspective, many leading consulting firms and business periodicals have recently promulgated the narrative that China is on the rise while the U.S. is either stagnant or in decline. McKinsey & Company (2019) argued that “China has given rise to a vast middle class that is an engine of global demand,” (p. 59), and “the map of global demand is being rewritten... with China (being) the largest part of the story” (p. 58). Similarly, Harvard Business Review describes multiple factors affecting globalization but highlights a few conclusions about China’s continued rise and separation as an economic center, “Expect supply chain shifts to accelerate when business travel opens up again, but with most pre-pandemic trends, such as China plus one sourcing, continuing.” (Altman and Bastian, 2021, p. 2) In addition, they argue, “The DHL Global Connectedness Index 2020 report also looks for evidence of the global economy fracturing into rival blocs. U.S. – China decoupling has advanced somewhat since the onset of the trade war in 2018, but these economies remain highly intertwined.” (Altman and Bastian, 2021, p. 4).

This East versus West multipolar perspective also permeates more recent scholarly literature, but the main thrust of these analyses frequently involves an evaluation of political economic systems. For example, Owen (2021) explicitly identifies and focuses on the emergence of two international orders – China and the U.S., with the premise being that the separation will be driven by the incongruence of two political systems. “China is attempting through various means to build a niche that will eliminate the liberal bias in international institutions and safeguard its own Market-Leninist regime.” Alternatively, Paul (2021) argues that the ongoing decay of globalization has been strongly influenced by the decline of the West due primarily to failures of income distribution and institutional malaise. Other papers also identify the emergence of a bipolar economic order including the idea that a “realism” model of deglobalization, “sees the end of U.S. hegemony and the rise of China as a geostrategic competitor...” (Witt, 2019, p. 1054).

2.2 Deglobalization

If globalization involves the *interdependence* of products, supply chains, capital, and implicitly the political frameworks that allow and facilitate these cross-border exchanges (Dynkin, 1992; Keohane and Nye, 2020), then it must follow that any lessening of cross-border interdependence must lead to a reduction of classical globalization into a state of lesser globalization, i.e., deglobalization (Ambos, et al., 2020; Kim, et al., 2020; Goldberg, et al., 2023). Although not as large as the globalization literature, research into deglobalization is both significant and gaining momentum.

A slowing global GDP, the economic shock of Covid-19, trade wars between the U.S. and China, and a larger resistance to geoeconomic expansion are all factors being analyzed under the deglobalization umbrella and given euphemistic labels such as “Slowbalisation” (The Economist, 2019) and “Glocalization” (Malmgren, 2022). For example, since the 2019 Economist article, numerous papers have examined slowbalisation in terms of possible impacts of the slowing

global GDP on globalization processes (Feffer, 2019) or in terms of predicted negative effects of policy-driven geoeconomic fragmentation from the rise of national populism (Aiyar and Ilyina, 2023).

Alternatively, Glocalization is a somewhat broader concept that started mostly in the late 1990s and early 2000s in the sociology literature with a concern that cultures may be internationalized (Robertson, 1995), or which took a decidedly anti-business/anti-capitalism predilection regarding the globalization phenomenon (Bauman, 1998), but it has risen to such significance that entire academic books were written on the subject (Roudometof, 2016). From a business perspective, glocalization has evolved to cover a wide variety of topics including being a platform for assessing marketing strategies across cultural boundaries (Grigorescu and Zaif, 2017), a framework to pursue and ensure corporate social responsibility objectives (Madubanya, 2023) and sustainable production (Tepliuik, 2023), and even as a concept that overlaps Slowbalisation in terms of being a key driver of the fragmentation of the global economy (Arkhipov and Yeletsky, 2021).

2.3 Missing from the Traditional Research

Evidence and scholarship regarding the globalization / deglobalization phenomena is vast and compelling, and while the author agrees with much of what has already been written on these subjects, many of the emerging deglobalization trends are likely to be very impactful to senior executives and boards of directors of multinational corporations but appear to be unrecognized or underrecognized in previous research. For example, it seems clear that the growing trend of nationalistic populism is affecting the speed and trajectory of cross-border commerce and public policies, but there is relatively little research addressing how these policies – which, by definition, often include strong, company-level incentives and disincentives to favor a given country jurisdiction over another – are likely to affect the formulation, dissemination, implementation, revision, and governance of strategic plans across multinational corporations. Furthermore, there is also very little research exploring how the rise of and exponential growth in the use of social media technologies to launch near real-time activist campaigns interacts with the recent trends towards more nationalistic public policies further increasing the speed and magnitude of risks faced by senior executives during their formulation and implementation activities. Finally, because globalization research, global financial institutions, and existing public policies have tended to favor an East-West bipolar future paradigm, possible changes in the timing and location of regional centers of economic gravity may also be creating a significant risk to multinational corporations in terms of being able to quickly revise well-established supply chains, capital structure covenants, government and regulatory relationships, and other internal competencies from one multipolar reality to another.

III. Population Growth Demographics: A Catalyst of an Alternative Multi-Polar Future (i.e., Different Geographical Epicenters of Economic Power)

Population demographics are generally outside of governmental control in the near- to medium-term, relatively easy to predict, and essentially inevitable across a twenty to thirty-year timeframe, barring some type of war, epidemic, or sudden mass-migration. This is important because many of the current centers of economic gravity – Europe, Japan, South Korea, and even China – that have been enabling traditional globalization are facing population trends that are not supportive of sustaining historical levels of economic growth. For example, major economies within the European Union, such as France, Spain, Germany, and Italy, have some of the lowest birth rates per capita in the world (CIA Factbook, 2022) with some forecasts showing an overall decline in population beginning in or near the 2020 – 2023 timeframe (United Nations, 2022). Similarly, South Korea, Taiwan, and Japan have birth rates that are lower than in Europe (CIA Factbook, 2022), and China’s low birth rate plus its historical one child policy has resulted in reports that China’s total population may have already started to decline raising questions about China’s longer-term economic power (Peng, 2022; Lavin, 2022).

Although there continue to be alarms sounded regarding possible overpopulation of the earth mostly by those who are concerned about pressures on the environment, the problem of population decline in industrialized economies has been known for many years but without as much media attention. Initial efforts to stop or stabilize population decline have generally failed. Birth rates have generally not improved, and the crisis is now causing more governments to implement additional emergency policies to increase births and net immigration. For example, France identified the problem back in 2005 and instituted more maternity benefits (Henley, 2005), but this failed to have a significant impact, so current officials are again voicing concerns about a threat to the French social order and installing policies both to incentivize more births and to increase net immigration (Bayrou, 2021). Similarly, Japan has begun paying new mothers for each child born (Baseel, 2022), and China is discouraging non-medical abortions and offering fertility treatments to have more children but only for married women (Stevenson, 2022).

Alternatively, India and many countries encircling the Atlantic Ocean, e.g., Central America, South America, and Africa, are expected to see substantial increases in their net populations over the same timeframe (United Nations, 2022). The United States and the United Kingdom both have below average birth rates, but their total population growth rates remain stable and slightly increasing due in large part to substantial immigration (United Nations, 2022). The very recent record migration of undocumented people entering the U.S. might slightly shift the net populations of parts of Central America and South America, but it is unlikely to negate the larger claim about the Western Hemisphere.

From a political standpoint, some countries with the worst population growth and demographic composition dynamics (e.g., population pyramid statistics) appear to be pursuing expansionary and even militaristic strategies perhaps as a mechanism to grow acquisitively instead of organically or perhaps to distract their populations away from growing social disaffection. For example, in response – perhaps – to the low population growth rate and the imbalanced population of young men to young women due to the one child policy, and enabled by the rise of a dominant, authoritarian political leader who was recently elected to an unprecedented third term as President, China is in the process of attempting to establish a military hegemony in the Pacific region (McDevitt, 2015; Romaniuk and Burgers, 2019) including increasing the subjugation of Hong Kong (Chang, 2020; Lindsay, 2022), the provocation of nearby rivals such as India, Australia, Japan, and the Philippines (Babones, 2021; Moriyasu, 2022), and the overt physical and verbal threats of military invasion of Taiwan (Chang, 2022).

Overall, it is illogical to assume that unless there are substantive (and improbable) changes in the population demographics of China and Europe that they will rise to be stable economic counterbalances to the U.S. in the next thirty to forty years; thus, it is difficult to justify long-held views of a China-U.S. or China-U.S.-European multipolar future. Instead, population demographics suggest a rise in the economic power of India, the larger Western Hemisphere community, and potentially Africa depending on progress in establishing and maintaining the rule of law and free market principles. Assuming the U.S. maintains its ability to provide fossil fuel energy to itself and its allies in the next twenty years while continuing to make progress on renewable and sustainable energy technologies, it is also unlikely that this key driver of the geopolitical order, i.e., access to reliable, low cost energy, will unseat the U.S. from its current strong economic position.

Understanding Possible Impacts on Multinational Corporate Strategy

The previous sections summarized key aspects of globalization research and the more recent rise of deglobalization before posing a counterargument that trends in population growth demographics may lead to a different set of regional economic hubs than previously highlighted in multipolarity theories. Although this discussion focused on macroeconomic and country-level dynamics, the implications will likely have many direct and non-trivial impacts on individual corporations and the executives who run them, e.g., restructuring supply chains, developing alternative sources of financing, adjusting to regional changes in demand for products and services, etc. Furthermore, a deeper exploration of the nationalistic populism movement suggests that policies are being written in a way that rewards and/or punishes individual

companies based, in part, on loyalties to a home country. If implemented, these types of regulations and policies could potentially impact organizational structures, governance structures, countries within which a company operates, and even the extent and types of partnerships that are developed. Finally, the rise of Sarbanes-Oxley style regulations increases the potential for criminal charges to be brought against individual executives should the company misreport information or not meet a given compliance requirement. When combined, this is an issue of critical importance to individual companies and individual executives, and therefore to the field of strategic management.

The next three sections dive more deeply into defining these macroeconomic drivers and describing why and how they will directly affect the decisions of individual companies.

IV. “Geopolitical Tribalism” (Nationalistic Populism) and Coercive Domestication

“Geopolitical Tribalism” is a phrase coined herein which recognizes the nationalistic populism movements in North America, Europe, Russia, and China, the rise of military tensions in the Pacific region and Ukraine, and the formation of new – or enhancement of existing – economic and military alliances.

Geopolitical tribalism generally refers to the creation or enhancement of national alliances, legislation, and regulations that not only promote the increased relative security of domestic and/or intra-tribal populations, but it also specifically includes legislation and regulations that promote the competitiveness and loyalty of domestic and intra-tribal companies.

“Domestication” – a major subcomponent of tribalism – is a play on words also coined herein that specifically refers to efforts by a government to bring economic activities home to a more controlled or friendly jurisdiction. This can also include potential punishments for companies that operate in or have suppliers from a specific rival tribe – i.e., “Coercive Domestication.”

Domestication is defined herein as the purposeful aggregation of incentives, disincentives, and regulations promoting domestic manufacturing, production, supply chain, financing, tax payments, and employment, as well as promoting nearshoring, backshoring, and public demonstrations of loyalty to the primary sovereign.

Nearshoring can be defined as “relocating some previously offshored manufacturing activities so that they are now close to previous core locations, but not so close as to suffer from disagglomeration effects” (Piatanesi and Arauzo-Carod, 2019), while backshoring can be defined as a “re-concentration of parts of production from own foreign locations as well as from foreign suppliers to the domestic production site of the company” (Kinkel and Maloca, 2009).

In addition to Russia’s war in Ukraine leading to the strengthening of long-held alliances such as NATO, there are a number of examples of emerging tribal clusters based firstly on China’s overt ambitions in the Pacific Basin, South America, and Africa, and secondly on the inherent demographic challenges of Japan, South Korea, and Europe. Examples include, but are not limited to, the “Three Seas Initiative” in Eastern Europe (Zbińkowski, 2019), the “Quadrilateral Security Dialogue” (the “QUAD”) between India, Japan, Australia, and the United States (Gale and Shearer, 2018), and the “Anglosphere Alliance” which involves strengthening and making more formal the commercial, intelligence, and military relationships between English-speaking countries such as the UK, Canada, the US, Australia, and New Zealand (Peters, 2021).

From a strategic management perspective, a major reason for defining geopolitical tribalism and domestication is, in part, to recognize that the complexity of legal and regulatory risks for corporations will likely increase dramatically over the next few decades as the calculus includes not only understanding and abiding by the rules and regulations within a given country, *but also*

by the potentially negative ramifications of punitive and dynamic sanctions associated with engaging in trade with companies domiciled in politically adversarial countries. Understanding which countries are likely to form political and legal alliances, at the same time that global economic epicenters of power are likely realigning due to differences in population growth demographic, will be critical to the longer-term supply chain, financing, structuring, and governance decisions of individual corporations.

V. Examples of Geopolitical Tribalism and Domestication

It is important to recognize that these trends are both substantial and persistent and therefore merit consideration. The following section provides examples to clarify and substantiate this argument.

The evidence of an evolution back towards a greater level of national independence is substantial and growing, including trends covering the political realm, immigration, supply chain, monetary policy, and energy production, among others – with a more dramatic manifestation brought to light by the Covid-19 pandemic and the invasion of Ukraine by Russia. For the sake of brevity, the following examples summarize only a small portion of this evidence mostly for the purposes of providing evidence to support the arguments posed above about the emergence and importance of geopolitical tribalism but also as guidance and context to multinational corporations.

5.1 Political Underpinnings

One of the most obvious recent examples of deglobalization from a political perspective includes the separation of the UK from the EU, i.e., Brexit, based in part on arguments regarding national sovereignty over EU-level economic, social, and immigration regulations. Other examples include the recent and possible future election of more populist nationalistic leaders such as President Donald Trump in the U.S. and of President Viktor Orban in Hungary. Specifically, within the four years of his term, President Trump overtly pursued policies focused on increasing domestic independence regarding key factors of the economy and national security under the motto of “America First.” A few examples include aggressively incentivizing U.S.-based companies to build or move manufacturing facilities back to the U.S., punishing companies that chose to move existing domestic manufacturing out of the country, and forcing the restructuring of the North American Free Trade Agreement (NAFTA) into a new agreement called the United States-Mexico-Canada Agreement (USMCA) with more favorable terms for domestic U.S. producers.

More recently, similar nationalistic movements have arisen in the Netherlands, Germany, and Argentina. In the Netherlands, the rise of politician Geert Wilder and the NVV party has coincided with a push for “Nexit,” which is the idea of the Netherlands leaving the European Union like the UK’s Brexit departure in 2020 (Daltan and Sarcar, 2023). In Germany, “Dexit” (Deutschland Exit) and the rise of the AfD party (Alternative für Deutschland) has gained sufficient momentum that the current German Chancellor is warning of imminent economic doom if this trend continues (Chazan, 2024). And finally, the election of Javier Milei in November of 2023, an economic libertarian, as President of Argentina was based in large part on his fiery anti-socialist, pro-nationalistic rhetoric. Together, these examples suggest that the nationalistic populism of Hungary, the UK, and Trump’s tenure in the U.S. is still gaining momentum across Europe and now parts of South America.

5.2 Energy Trends

From an energy standpoint, a strong push continues for globalized policies aimed at decarbonization and climate change regulations (e.g., the Paris Climate Agreement in 2016), but momentum is simultaneously building towards having greater levels of energy independence at a country or regional level. Examples include President Trump formally withdrawing the U.S. from the Paris Climate Agreement in 2020, restructuring domestic regulations regarding domestic oil

and gas (Baker, 2020), and Canadian officials' efforts to establish cross-country pipelines and new liquefied natural gas ("LNG") terminals on the Pacific and Atlantic Ocean coasts (Bronskill, 2019).

5.3 Examples Emerging from or Highlighted by Covid-19

The rise of the Covid-19 pandemic brought increased awareness of controversial global interdependencies and further energized the push for greater national independence. One example was the realization during the early stages of the pandemic that China controlled a significant portion of the global production of antibiotics and supposedly threatened to restrict supply to foreign countries during contentious parts of national supply chain and tariff negotiations (Taylor, 2020) leading to multiple calls in Washington for increased domestic manufacturing of basic medicines on the grounds of national security (U.S. Congressional Bill S1176, 2021).

5.4 Examples Highlighted by the Invasion of Ukraine

The invasion of Ukraine by Russia on February 24, 2022 has further highlighted growing concerns over interdependent global supply chains as well as to vulnerabilities to global economic and financial interdependencies. For example, the war in Ukraine highlighted the growing concern over the interdependency of economies and currencies and how government sanctions and very fast corporate activism can be used as a weapon of war. Many major corporations were the first to act, followed soon thereafter by more formal governmental sanctions. Within a matter of a few weeks, Russian citizens found that their ability to travel on major airlines (e.g., American, Delta, KLM, and Lufthansa), access food and restaurants (e.g., Heineken, Coca Cola, McDonalds, Starbucks), buy farm equipment (e.g., Caterpillar, Lely, John Deere), send packages (e.g., FedEx, UPS), and even access to the use of their credit cards (e.g., Visa, Mastercard) had been cut off or severely limited due to major corporations shutting down operations in Russia. Governments (e.g., U.S., Japan, European Union) then imposed sanctions that shut down the Russian central bank's ability to access reserves that were held in gold or foreign currencies (Gordon, 2022).

Whether these governmental sanctions prove to be impactful longer-term or not, the immediate reaction of the world's major economic powers as well as many of the world's largest corporations against a specific military antagonist will not go unnoticed by military and governmental strategists. In short, this example proved that the interdependency of global commerce and currencies can be used as a weapon in ways never before witnessed. It is not unreasonable to assume that governments will seek to erect barriers against or to separate themselves from the types of punitive economic actions brought to bear against Russia, and this will likely include the pursuit of greater levels of supply chain, food, energy, medicine, and monetary independence.

VI. Social Media Enabled, Nearly Instantaneous Stakeholder Activism

The examples above demonstrate that trends towards nationalistic populism are continuing to gain momentum – or at least not showing signs of decline – which has the potential to substantively change the rules, regulations, incentives, and disincentives governing the structure and strategies of multinational corporations. Transitioning to accommodate these changes carries substantial risks, at the very least in terms of maintaining good working relationships with the governments of different countries when those countries are instituting punitive measures for not showing loyalty to their “home” country. But this rise in risk from geopolitical interests is coinciding with a surge in risks from nearly instantaneous corporate activism via social media platforms. To understand how modern multinational corporations are likely to execute their function of strategic planning, governance, and stakeholder communications, it is critical to understand the interactive effects of operating under the gaze of often vehemently opposed stakeholder communities.

The emergence of social media as a global, impactful medium for change generally coincides with the exponential rise in volume of online stock trading, and both of these are relatively recent phenomena. For example, most of the famous social media platforms are fewer than twenty-years-old. Google was founded in 1998, Facebook in 2004, YouTube in 2005, Reddit in 2005, Twitter in 2006, Sina Weibo (China) in 2009, and WeChat (China) in 2011. Similarly, the online trading market officially started somewhat sooner due to a ruling by the U.S. Securities and Exchange Commission on May 1, 1975, allowing for price deregulation of the brokerage industry which quickly led to the creation of discount brokerages such as Charles Schwab, Ameritrade, and E*Trade. However, the exponential growth in the volume of stocks traded did not fully manifest until after 1998 when the U.S. Securities and Exchange Commission published its ruling allowing computerized and algorithmic trading. By 2010, the exponential rise of algorithmic trading had become a major topic in the mass market business media (Salmon and Stokes, 2010) and sufficiently controversial that a number of academics papers were focused on examining the phenomenon (McGowan, 2010).

The takeaway here is to suggest that only within the last two decades has the infrastructure been in place for millions of people (many of whom are not trained in basic economics or business fundamentals) to buy and sell a company's securities or comment on a company's activities in a nearly instantaneous way based on information that is often unvetted, unsubstantiated, and frequently counter to economically rational practice. In this type of world, rumor often rules the day, and the value of a company's financial assets can change radically within hours instead of weeks or months. The 2020-2021 trend regarding "meme" stocks, e.g., GameStop, AMC Entertainment, and BlackBerry Limited, is a classic example where the rise of commission-free online trading platforms like Robinhood and online social media platforms like Reddit greatly increased the amount of online trading by untrained traders.

The ability to have an almost instantaneous impact on a company's stock, often based on rumor or innuendo, is very important when considering the existence and sophistication of various consumer and stakeholder activist groups. Once again, a deep exploration of this topic is beyond the scope of this paper, but there are a variety of examples where either grassroots or formally organized campaigns to "cancel" companies or individuals were pursued to achieve a certain political or ideological objective. A few examples include, but are not limited to, JK Rowling, author of the Harry Potter series, and Ted Sarandos, CEO of Netflix (Transgenderism); Bud Light beer (Transgenderism); SeaWorld (Animal Rights); and innumerable examples of environmental activism on companies' carbon emissions (various utilities and oil companies), green energy, deforestation, chemical use, and genetically modified crops and foods (e.g., Cargill).

The primary conclusion here is that consumer and stakeholder groups can use social media and legal strategies to exert almost immediate pressure that can have tremendous impact on an individual company's market value and political capital if they are perceived to be out of compliance with the preferences of those groups. As a result, social media enabled stakeholder activism further complicates, and frequently threatens, specific corporate leaders as well as the decision-making environment in which they must operate. In other words, corporations must navigate the increasing risks of dynamic changes in and across geopolitical tribes while avoiding attracting the negative attention from stakeholder activists who can dramatically alter the economic stability of those same companies if they are seen taking actions against the ideologies of conflicting stakeholder groups.

VII. Managing Multinational Companies in the Emerging Hyper-Risk World

This paper argues that the risks currently facing multinational corporations are unprecedented due, in large part, to population growth demographics driving the emergence of new and underrecognized centers of economic gravity over the next thirty to forty years, tectonic shifts in geopolitical tribalism with the emergence of nationalistic populist governments and "country-first" economic policies, and the interaction of these changes in an environment of near instantaneous, economically impactful stakeholder activism through organized social media

campaigns. It is not hyperbole to suggest that in the next decade risk reduction and mitigation strategies may well become a primary driver not only of organizational survival but of sustainable competitive advantage.

7.1 Three Likely Strategies of Risk Mitigation/ Accommodation

The author believes multinational companies will likely protect their interests moving forward by implementing some combination of at least three key risk mitigation / accommodation strategies, 1) ostensible decentralization to create plausible deniability, 2) supplier optionality by tribal affiliation, and 3) increased competencies in the areas of governmental affairs, financial engineering, and compliance.

Ostensible Decentralization

Ostensible Decentralization is a category of risk reduction strategies intended to reduce potential political and stakeholder pressures via the actual decentralization or the *appearance* of decentralization of operations, administration, governance, and communications activities.

Proposition 1: Decentralization of Operations. *For those companies where the international portion of the business is so significant that retraction back to or nearer to the home country is not feasible or economically attractive, it is likely that those organizations will find it advantageous to decentralize (or to be able to claim they are decentralizing) operations or to restructure into more elaborate partnership arrangements.*

As nationalistic and tribal pressures increase, it is reasonable to assume that greater levels of local responsiveness and personal relationships will be increasingly beneficial. However, in addition to the implementation of greater decentralization, it is believed that public messaging about moving to a more decentralized structure also carries a potential benefit in that it lays the foundation for claiming a degree of separation from the decisions made by the organization in other countries and therefore a certain level of plausible deniability for executives and board members at the corporate level.

Proposition 2: Ostensibly Decentralized Governance. *As incentives to decentralize international operations and regulatory compliance increase, companies will likely also be incentivized to increase ostensibly decentralized board and governance personnel, policies, and oversight.*

Similar to the previous proposition, the need to demonstrate local responsiveness while having increased layers of preemptive bureaucratic policies will very likely extend to governance and compliance processes of a corporation. This is a continuation of the argument regarding overt operational risk rebalancing while increasing the plausible deniability of the corporate-level executives and directors.

Proposition 3: Decentralized and Formalized Political/Social Commentary. *There will likely be continued and potentially increased pressures on individual companies to proactively participate in nationalistic and social proclamations (e.g., condemnation of Russia by companies; and/or promotion of or opposition to environmental, sustainability, & governance (“ESG”) initiatives) even if it results in lower near-term financial returns. As a result, companies will likely need to preemptively establish more formalized policies and monitoring practices on which to guide the company regarding political and social commentary to help avoid or mitigate castigation by governments in other tribes or by potentially impactful stakeholders.*

Being compelled to make proclamations for a given political or social agenda in an increasingly adversarial macroenvironment raises myriad ethical concerns as well as potentially serious agency costs. However, organizations often find some semblance of reprieve from these types of external pressures if they can refer to existing, objective, and preemptively established policies dictating when and how it engages in such demonstrations. Although this will not eliminate the pressure to “take a side” in a public debate, using internal bureaucracy and

ostensibly decentralized policies and governance as a protective cloak has the potential to deflect and delay all but the most virulent of pressure groups.

Supplier Optionality by Tribal Affiliation

Proposition 4: Supplier Country Optionality. *The increase in tribal political rivalries will very likely extend beyond the location of a company's headquarters and tax jurisdiction to an organization's supply chain of goods and services. As a result, companies will likely benefit from supplier diversification, not just in terms of the number of potential suppliers from a price negotiation standpoint (e.g., reducing monopolistic or oligopolistic price pressures), but in terms of the political tribe(s) in which the supplier(s) operates.*

Given the trade disputes between the Trump administration and China, cir. 2017-2020, the significant supply chain problems with China due to Covid, and the ongoing threat of military action in the Pacific region by China, many companies have already begun to move all or a significant portion of their supply chain from China to other low-cost countries such as Vietnam (Samuel, 2020). In fact, it seems logical to assume that most companies that have a significant percentage of their products supplied by China (which is purposefully a different metric than the number of suppliers of a given product) and that expect to have a tribal primacy with North America, Japan, South Korea, etc., will or should be preemptively planning for possible alternative suppliers. Supplier optionality also helps to mitigate ongoing social media attacks against the ethics / morality of manufacturing some or all of a company's products in countries with high levels of poverty and/or that have safety standards that are below that of first-world countries.

Competency Enhancements

Proposition 6: Government Affairs. *Increasingly heterogeneous rules and regulations, plus increased risks of legislative and regulatory punitiveness by antagonistic governments, will likely incentivize the creation of increasingly large and complex government and regulatory affairs departments, which in turn will likely rely more heavily on decentralized and preemptively formalized corporate policies.*

This is a basic tenet of Public Choice Economics (Buchanan and Tollison, 1984). As the intrusion of governmental mandates increases, so too does the need for companies to increase their competencies and involvement related to government and regulatory affairs. From a geopolitical tribalism perspective, local jurisdictional relationship building and an increased degree of separation from corporate headquarters (perceived or real) through more formalized corporate policies have the potential to provide non-trivial benefits to the firm.

Proposition 7: Financial Engineering. *Increased sanctions, tariffs, and punitive tax policies are all likely to be deployed to establish and maintain tribal loyalty; thus, it is likely that organizations will need to expand the financial and accounting capabilities needed to refine spending and capital structures in a way that minimizes regulatory and tax liabilities as well as stakeholder provocation.*

Governmental policies are often enforced by monitoring, regulating, taxing, and restricting the flow of capital into and out of companies. As a result, it is logical to assume that tribal loyalty will be enforced using these financial tools. In a world with increased financial scrutiny and the likely advent of digital currencies – both traceable and distributed ledger – multinational corporations will almost certainly need to expand their competencies in these areas as well as to the board of directors to govern these activities.

Proposition 8: Compliance. *Increased governmental and regulatory scrutiny to promote and ensure tribal loyalties will necessitate an increased ability to demonstrate compliance; thus, internal auditing and compliance departments will likely be expanded and probably specialize by tribal affiliation to accommodate this increased intrusion and potential liability.*

Riding the momentum of outrage caused by the scandals of Worldcom and Enron, among others, the U.S. Congress quickly passed overtly interventionist legislation known as the

Sarbanes-Oxley Act of 2002 that focused primarily on increasing governance and independent oversight of publicly traded corporations and the public accounting firms that ostensibly provided objective audits of company financials. Variations of Sarbanes-Oxley were then quickly adapted and passed in a large number of other countries, including but not limited to Canada, Germany, France, India, and Japan (Tafara, 2006). An in-depth discussion of this law is beyond the scope of this paper, but three sections of particular importance are 302, 906, and 404. Sections 302 and 906 essentially defined broad situations where executives and board members could be held personally (and even criminally) liable for various issues related primarily to corporate reporting. Section 404 created requirements for a massive expansion of employees, assets, systems, and policies to create and annually document an extremely large set of internal auditing activities.

SOx is highlighted in this paper because it deeply embedded a large and perpetual structure of personnel and processes within corporations whereby governments continuously refine and impose compliance regulations on firms. It is not unreasonable to assume that the sections allowing for personal and criminal prosecution of executives and board members could be refined by particularly aggressive governments to include compliance with tribal requirements thereby greatly increasing the decision-making complexity and risks borne by executives and members of the board.

VIII. Conclusion and Implications for Organizational Strategy

A primary purpose of this paper was to articulate some of the key drivers behind the emergence of an unprecedented hyper-risk environment facing multinational corporations, then offer a series of propositions about how companies will likely accommodate or mitigate these new risks. The three main drivers of this new world dynamic include an increase in nationalistic deglobalization, a change in the likely regions of future economic power due to population growth demographics, and the unprecedented change in near instantaneous stakeholder activism through mass market social media platforms. The paper did not make a normative argument that nationalistic deglobalization (described herein as geopolitical tribalism) is inherently good or bad. Instead, this phenomenon simply creates a substantive change in the incentives and disincentives driving global commerce such as decisions regarding the risk adjusted value of operating in a given country or with a given network of suppliers.

The topics in this paper are quite large in scope which makes it difficult to adequately describe the interactive effect of these trends on firm-level strategy. Although each of these factors is important on its own, the author believes that only when seen as a larger, interdependent system can the magnitude and speed of risks be more realistically understood. It is hoped that this paper will serve as a foundation for much deeper theoretical and empirical analyses of each major risk component as well as a general wake up call to practitioners who may not yet have recognized the wave of change that has already begun.

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Bangladesh Exports to the United States: Some Determinants

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Abstract

Using unit root testing, multivariate cointegration and vector error correction modeling and utilizing the longest annual time-series data for the period from 1972 to 2017 ever used in previous studies, this study examines the long-run equilibrium relationship between real exports from Bangladesh to the U.S., bilateral real Taka/dollar exchange rate, and U.S. real income and the degree of U.S. globalization. The real exchange rate reflects the relative price of exports and U.S. real income reflects the foreign demand and the U.S. globalization reflects the degree of U.S. openness in the global market. The cointegration tests and the associated short-run dynamic analysis confirm the existence of long-run relationship among the variables. The system is found stable with a short-run speed of adjustment at the rate of about (to be estimated) per year. The dominant positive effects on exports came from U.S. real income demand and the U.S. global integration. However, the bilateral real exchange rate variable displayed results that were not consistent with the traditional hypothesis for Bangladesh. The results indicate that the policy makers need not worry that much about the exchange rate issue, rather focus more on developing better economic and diplomatic relationship with the U.S., the largest market for Bangladeshi export goods. As such, the country needs to put more diplomatic and lobbying efforts in the U.S. and organize more trade missions in the U.S. to obtain further access to the U.S. market. Furthermore, more studies incorporating additional variables along with the possible utilization of disaggregated (product specific) data would be helpful to reconfirm the results. The study would be useful to policy makers in Bangladesh and the U.S., academics, think tanks, international organizations, and actual; traders (exported and importers in both countries).

Keywords: Real export; real exchange rate; co-integration; vector error correction; Bangladesh; the U.S.

JEL Classifications: F14, F23, F31

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Crisis Conditions, Emerging Risks, and their Characterizations

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Abstract

Crisis is an omnipresent concept. The various ways to explain crises and risks frequently cited in the media make it difficult to understand what is being discussed. This article presents different conditions and characterizations for crises to provide an easier understanding of the various crises that exist and how the concept of crisis is defined. Risks that are associated with times of crises are introduced to help identify certain conditions. Information about the crisis was mainly obtained from economics and management publications and a short bibliometric analysis.

Keywords: Buzzwords; crisis; risk; metaphors; characterizations

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The Impact of Post-Pandemic Cybersecurity Risk Control on the Pharmaceutical Company's Reputation

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Abstract

As we enter the post-pandemic era, executives in the pharmaceutical industry have come to recognize the importance of not only creating capabilities that enhance competitive advantage and value for the business but also protecting the business from factors that could harm the company's reputation, including cyberattacks, quality issues, and compliance problems. This study examines the impact of post-pandemic cybersecurity risk control on the reputation of pharmaceutical companies. The research also focuses on the role of top-level executives in enforcing information control policy and investigates the potential effect of the SEC's proposed requirement for U.S. public companies to disclose corporate board directors with cybersecurity expertise. The study employs both analytical and empirical techniques, which include a thorough review of relevant literature and a web-based survey of 119 cybersecurity and IT professionals from pharmaceutical companies. This survey aims to provide management teams with a better understanding of their cybersecurity risk control objectives, requirements, challenges, and concerns, as well as their reputation protection strategies.

The multiple linear regression analysis conducted shows that internal cybersecurity risk control and executive involvement in the "cybersecurity risk control governance" committee or executive support for cybersecurity maturity are positively related to a company's reputation. The survey also reveals the statistically significant impact of the SEC's requirements for board members' cybersecurity expertise on a company's reputation. These findings offer valuable insights and recommendations for policymakers and decision-makers interested in implementing better risk control policies to safeguard crucial research data and enhance a company's reputation. Additionally, the study sheds light on the evolving needs of the pharmaceutical industry to maintain effective cybersecurity measures and overcome the challenges in achieving ongoing cybersecurity maturity, especially in the post-pandemic period. The study concludes with a discussion of the study's contributions, limitations, and future research directions.

Keywords: COVID-19; post-pandemic; cybersecurity; risk control; SEC requirements; company reputation.

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Exploring the Effect of Deepfake-Based Advertising on Consumers' Attitudes and Behaviors

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Abstract

Deepfake is a highly sophisticated manipulation produced by Artificial intelligence (AI). The rapid advancement in AI technologies, particularly machine learning (ML) and deep neural networks (DNNs) make highly realistic fake content generated by deepfake harder and harder for human eyes to differentiate. As a form of efficient disinformation, deepfake can be misleading and cause problems in many fields. However, if used properly, deepfake can create major business opportunities. Because manipulation has been widely adopted in advertising, deepfake can be a huge game-changer for advertising by using synthetic manipulation. This study examines the effects of deepfake-based advertising on consumers' attitudes and behaviors and further compares the effects with those of regular advertising on consumers' attitudes and behaviors. The results of this study not only guide advertisers to adopt deep-based advertising properly and achieve positive affection on consumers' attitudes for their brands and companies, but also shed light on future research on deepfake-based advertising.

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The Empire Strikes Back: The Effect of Historical and Cultural Affiliations on the Allocation of FDI in Eastern Europe

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Abstract

This paper investigates whether culture and history impact the spatial allocation of foreign direct investment (FDI). The importance of culture is well documented in both the international business and economics literature; however, the causal impact of culture on the location of FDI has been difficult to determine. In this study, we implement a spatial regression discontinuity design to test for discontinuous changes in investment at the historical border of the Habsburg Empire. There is evidence that the empire had a long-lasting impact on culture, trust, and institutions in its territories. We propose that countries sharing a former affiliation with the empire will be more likely to invest in each other today. The former empire had a border which ran through several present-day countries. Cities located on either side of this historical border have shared common institutions for the last 100 years. This unique setting allows us to identify a cultural effect that is separate from institutions, nationality, religion, and language. The results suggest that there are between 0.24 and 0.32 additional investments per 10,000 individuals coming from Habsburg-affiliated countries in the former empire territories of Romania and Serbia today.

JEL Codes: R3, F12, O12, N94

Keywords: Foreign Direct Investment, Economic Development, Economic History, Culture

I. Introduction

Culture is an integral aspect of international business and economic decisions. When foreign firms decide to invest in a new country, they typically do so at a disadvantage relative to domestic firms. They must not only successfully establish operations in a new country, but they must do so while navigating a new culture, as well as relatively unfamiliar legal systems, organizational and managerial practices, and communication and negotiation styles. In this sense, their “foreignness” becomes a liability the greater the cultural distance between home and host country (Beugelsdijk and Maseland 2011). This fundamental hypothesis is extensively studied in the academic literature. Yet, the causal impact of culture on the location of FDI has been difficult to determine. This results from the fact that culture is difficult to define and is often entangled in other societal aspects such as institutions, the political economy, religion, ethnicity, language, and nationality which can also affect the allocation of FDI.

To understand the potential effect of culture and historical ties on the allocation FDI, we implement a spatial regression discontinuity design to test for discontinuous changes in investment at the historical border of the Habsburg Empire. The former empire had a border which ran through several present-day countries including Romania, Serbia, Poland, and the

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Ukraine. In this study, we choose to focus on two countries specifically: Romania and Serbia. Cities located on either side of this historical border have shared common institutions for the last 100 years. Any difference in the distribution of FDI on either side of this border should be attributed to the Habsburg cultural effect and the potential historical ties that were developed as a consequence of the previous empire affiliation. Several papers show that historical empire affiliations may affect the level of economic development today. Grosjean (2011) explores the effect of Ottoman rule on financial development today. She shows that Islamic rule is associated with lower levels of bank penetration across and within countries. When examining the effect of the empire within countries she notes that while the financial system is less developed in these areas, no other factors such as income or business development are affected. Peisakhin (2012) demonstrates that the Habsburg and Russian empires influenced the political identities and social norms of individuals living on either side of this no longer existing border in the Ukraine. In particular, differences in social attitudes towards Russia persist today. Grosfeld and Zhuravskaya (2013) examine the historical division of Poland between three empires: the Russian, Habsburg, and Prussian empires. The authors find no differences in income, industry, corruption or trust today, however, they do observe a persistence of culture as exhibited through religious practices and beliefs in democracy. Becker et al. (2016) show that Habsburg empire affiliation affects the levels of trust that individuals have in their court systems and police force today. These papers suggest that prior empire affiliations may affect the path of economic development. Similarly, Karaja and Rubin (2022) find in a field experiment comparing villagers on either side of the former Habsburg border in Romania find that long-time inhabitants of the villages on the Habsburg side of the border have a higher degree of trust towards outsiders than their counterparts on the other side. Papers that specifically examine the impact of the Habsburg empire, present evidence of a long-lasting cultural impact in former empire territories.

Building on these findings, we propose that the Habsburg Empire strongly influenced the culture of the territories it controlled, and that impact can be found in contemporary investment decisions. Therefore, it is likely that territories formerly belonging to the Habsburg empire would be more likely to attract FDI from countries also sharing a historical tie to the empire today.

The main analysis reveals that the number of FDI projects from Habsburg-affiliated countries is higher in the former empire portion of present-day Romania and Serbia today. Specifically, there are approximately 0.24 to 0.32 more “empire” projects per 10,000 individuals in former empire territories. There is no evidence of such a jump in investment projects from the rest of the world at this same border. Additionally, we find no evidence of a jump in any other characteristics that may impact this allocation of FDI at the former empire border.

Many of the previous studies examining the effect of culture on FDI are conducted at the country level and examine only one aspect of culture such as language or religion. However, culture is much larger than just one element of a population. Common language and religion are rough proxies for the elements that unite a people. While institutions also matter, most formal institutions are typically at the national level, making it difficult to determine whether the effect captured is due to institutions or culture. Other papers in the cultural economics and business literature use the Hofstede index to calculate a cultural distance between countries. While this index made great strides in allowing comparisons of cultural distance between countries, it also has many shortcomings. First, culture may not be homogeneous within a country, which may also affect the distribution of FDI. Additionally, the distance between two countries may not be symmetric. Finally, it is also a concern that all components of the Hofstede index are typically given equal weight in distance calculations; it is very possible that some dimensions may matter more in some business contexts than others (Beugelsdijk and Maseland 2011). By defining culture as belonging to a historical empire and examining variations in investment patterns within countries, we are able to separate the effect of culture from nationality, language, and formal institutions. This allows us to capture the effect of cultural differences and historical ties on the allocation of FDI today.

In the next section we place our research in the context of the current literature. Section 3 examines the historical background of the Habsburg Empire in order to better understand the mechanisms through which the empire affiliation may have impacted the culture and spatial allocation of FDI today. Sections 4 and 5 introduce the data and methodology, and Section 6

presents the main results of the analysis. Section 7 presents various robustness checks, while Section 8 concludes.

II. Literature Review

2.1 The Impact of History on Economic Development

It is now accepted that historic ties can impact economic development today. The importance of history for economic development is documented in a review of the literature by Nunn (2009). In previous studies the impact of history is mainly examined under the context of Europe's colonization and expansion. The channel through which history impacts development is through the effect that it can have on institutions (Nunn 2009). There are three main strands of literature which explore this proposition. The first relates to the importance of factor endowments and colonial rule to economic development. Engerman and Sokoloff (1994) examine differences in land endowments suitable for the cultivation of traded crops, like sugar, which were best produced on large scale plantations using slave labor. The study reveals that areas relying on slave labor promoted laws that protected the elites which resulted in political and economic inequality. While this first paper was primarily qualitative, subsequent extensions of this hypothesis also find negative relationships between the past use of slavery and economic development measures across states and counties, and new world countries today (Mitchener and McLean 2003; Lagerlöf 2005; Nunn 2009).

The second strand of literature examines the role of legal institutions transplanted during colonial rule and their effects on investor protection and financial development. For example, La Porta et al. (1997) find that British common law offers the greatest investor protection today.

The final strand of literature examines the historical origins of current institutions and their importance for long term economic development. The seminal Acemoglu, Johnson, and Robinson (2001) paper examines the disease environment in former colonies. The authors hypothesize that Europeans were more likely to settle in areas with less disease. As a result, Europeans were only able to set up growth promoting institutions, which protected property rights, in areas where they settled. In contrast, Europeans did not often settle in areas with harsher disease environments, and instead chose to set up extractive institutions in these colonies. The authors use an instrumental variable approach using early European settler mortality rates as the instrument for institutions to show that areas with lower mortality rates have higher per capita incomes today. These papers made great strides in determining that history impacts economic development. However, these papers do not explore why regions within countries may experience varying levels of economic development today. This paper differs from this body of literature by building upon the fact that history matters by examining the effect of history on regional development today.

Several papers make important contributions in the analysis of how history matters at the regional level. Dell (2010) examines the effect of the mita, a forced mining labor system established in Peru and Bolivia between 1573 and 1812. This paper uses a regression discontinuity design to compare outcomes in mita and non mita districts today. By comparing outcomes very close to the border, the author shows that the mita had negative effects on long term economic development. Specifically, she finds that consumption is 32 percent lower in the mita side which is driven by lower levels of education and less developed road networks. This is attributed to the fact that mita governments restricted large land holdings and it was the landowners that typically lobbied for a greater provision of public goods. In this case, history impacted the concentration of wealth and power which impacted the development path of these regions.

Ambrus, Field, and Gonzalez (2020) examine how disease can permanently alter the growth path of urban areas. In this paper the authors investigate the impact of the cholera epidemic in one London neighborhood. The cholera outbreak in this neighborhood was devastating. In one month, 5 percent of families lost their main wage earners and became impoverished. The authors demonstrate that this incident had an effect on neighborhood poverty, as captured by real estate

prices immediately after the outbreak. These differences in real estate prices persist even 160 years after the end of the epidemic suggesting that such localized health shocks can affect the trajectories of cities today. This paper will employ similar methodologies to Dell (2010) and Ambrus, Field, and Gonzalez (2020); however, it will build on this regional literature to examine the impact of history on another important aspect of economic development, the allocation of FDI today.

2.2 The Effect of History and Institutions on Culture

While it is evident from this discussion that history matters for economic development, history can also have lasting effects on cultural development. One important characteristic that history can affect is trust. Rather than examining the historical effect on income or consumption, Nunn and Wantchekon (2011) examine the role of history on trust in the context of the slave trade in Africa. They find very strong impacts of the number of slaves taken from an individual's ethnic group on an individual's trust in others today. The authors hypothesize that individuals carry culture with them while institutions are fixed in place. They use this definition to see which effects, culture or institutions, have a bigger impact on trust. If culture matters more, it should matter whether an individual's ancestors were enslaved. If institutions matter more, it should matter whether an individual lives in an area that was historically affected by the slave trade. The authors find evidence that both factors matter, but the effect of culture is stronger than the effect of institutions on trust.

Exploiting the location of the Habsburg empire in Eastern Europe, Becker et al. (2016) show that the Habsburg empire had persistent effects on the trust of individuals living in former empire regions today. The authors use the 2006 Life in Transitions survey data and employ a border specification to test whether individuals living in cities within 200 kilometers of the Habsburg border have higher trust in courts and police today. In addition, to higher trust in institutions, the authors also show that the Habsburg affiliation also impacts the extent to which individuals feel that they must pay bribes in courts or to police. The authors propose that in this case the Habsburg empire established cultural norms which are still present in the interactions of individuals with their respective institutions today. This paper lays an interesting and compelling foundation for my study. Since the empire affected cultural and social norms in former empire territories, this setting is an important one in which to examine the impact of these norms on FDI. It has long been recognized that culture can impact the allocation of FDI but compelling evidence, especially at the local and regional level, is limited.

2.3 Culture, Institutions, History, and FDI

There are several determinants of FDI that are well known. Of these determinants, one of the most important is distance. Distance can make international exchanges costly (Makino and Tsang 2011). Geographic distance increases transportation costs. Institutional distance affects the success and profitability of a prospective firm in a new location, as both formal and informal institutions define the rules of the game that shape economic exchanges and interactions (North 1990). Historical ties are important in reducing costs since they can shape shared values, norms, and cultural beliefs. Historical ties can also affect expectations and reduce uncertainty in international exchanges (Makino and Tsang 2011). Rangan (2000) argues that historical ties make the search and assessment of potential locations easier and less costly while also making ongoing operations more efficient. Additionally, interactions among countries which share historical ties may result in a positive feedback loop, where any similarities in cultural norms or institutions positively reinforce historical ties. This can also serve to narrow the "distance" between countries. Cultural distance can also be costly. Cultural distance can create behavioral uncertainty and can affect an investor's commitment to invest. Furthermore, it can impact the performance of the foreign firm in the new market. For these reasons, understanding the intricacies of culture and its effect on FDI is imperative to business leaders. Several studies find evidence of this effect.

Makino and Tsang (2011) examine the role of historical ties in the timing of FDI flows into Vietnam following the opening to international markets. The authors show that culture has a

differential impact on the timing of investment. Specifically, the authors find that investors from Mainland China moved in later than investors from Taiwan and Hong Kong. This is significant since Vietnam has historically experienced strained relations with Mainland China following the Sino-Vietnamese War. The authors also show that investors from socialist countries were early movers. This is a similar finding to Crane, Peterson, and Olikar (2005) who find that Russian investors are more likely to invest in former Soviet Republics today. Additionally, Makino and Tsang (2011) show that colonial ties can matter through their finding that French speaking countries were early movers.

Glaister, Driffield, and Lin (2020) examine the effect of prior colonial relationships on FDI in Africa. This is an excellent setting in which to examine this issue as Africa's recent history has been dominated by a variety of colonial arrangements. Colonialism has persistent impacts on the language, institutional structures, and business practices of former colonies. Each of these factors can reduce the liability of foreignness (Liou and Rao-Nicholson 2017). History can also create informal institutions that are hard to overcome. The ingrained image of a country or a potential investor is an example of an informal institution that can form through historical ties. This could be a positive image or a negative stigma that is associated with the investor, affecting the subsequent success of the foreign investor (Glaister, Driffield, and Lin 2020). For example, former colonies may experience negative feelings towards their colonizer stemming from past labor exploitation and resource depletion (Jones 2013; Nunn 2007). Glaister, Driffield, and Lin (2020) find a positive effect of prior colonial ties on inward FDI; however, the nature and influence of these historical ties are more complex than previously considered and vary with the colonizer. There is a positive effect on inward FDI from British investors. The authors suggest that British colonizers engaged in greater institutional development than other colonizers. This may have resulted in a positive historical tie between countries, making former colonies more open to receiving investment from British investors. The authors also find that the length of the colonial period negatively affects inward FDI, while the length of independence exhibits a u-shaped effect. Immediately following independence, due to a recent association of oppression, there is a negative effect on FDI. However, with time, the benefits of a longer shared history outweigh the negative effects of colonialism, generating a positive effect of the length of independence on FDI. While making important theoretical contributions for the importance of culture and history on FDI, both Makino and Tsang (2011) and Glaister, Driffield, and Lin (2020) only present evidence of the importance of culture on FDI at the country level.

Only a few other papers examine discontinuities in FDI and trade within countries. Ma (2017) examines the effect of language on the allocation of FDI in China. Ma (2017) examines investments from Hong Kong, Macau, and Taiwan at the borders of various dialects in China to show that cultural similarity increases FDI. Egger and Lassmann (2015) examine import behavior at native language boundaries in Switzerland to show that culture can affect international trade. They find that on average more products are imported from areas with a common native language (Egger and Lassmann 2015). Both of these papers are methodologically similar to our study in that they take advantage of the regional heterogeneity of culture within a country to estimate the impact on FDI or trade today. However, as discussed in previous literature, language is only one small facet of culture. It is cultural norms that can be more impactful. North (1995) suggests that while formal institutions can quickly change, informal institutions are less likely to change and may even endure over time. Since cities on either side of the long-gone Habsburg border have shared common institutions for the last 100 years, we do not argue that formal institutions impact the allocation of FDI today. Rather it is the informal institutions, or the cultural norms, that can impact the allocation of FDI. Becker et al. (2016) show that Habsburg empire affiliation affected the trust in institutions and perceived corruption that individuals living in former empire territories have today. However, based on these findings, it is not directly evident how this could affect FDI. It is possible that empire affiliation shaped the cultural norms of individuals and therefore impacted the functioning of the same institutions today (Tabellini 2010). However, if the only impact of the empire affiliation is the functioning of local institutions, there would be a discontinuity in all FDI at the border. If the empire affiliation affected cultural norms through a historical tie, there should only be a discontinuity in FDI originating from other former Habsburg territories. To our knowledge this study is the first to test these factors along with the intricacies

of culture and historical ties and their effects on FDI at a regional level. In order to understand the context and mechanisms through which the empire affiliation may have impacted the allocation of FDI today, it is important to understand the history and influence of the Habsburg empire in Romania and Serbia.

III. The Historical Background of the Habsburg Empire

The royal house of Habsburg was one of the most powerful and influential families in Europe. As early as the 11th century the house had acquired lands as far west as Spain and as far as Galicia (Poland) in the East. The association of the Habsburg name with Austria began when Rudolf IV of House Habsburg, ascended to the throne of the Holy Roman Empire in 1273. After that time, the empire continuously expanded eastward through wars until more than half of Europe was controlled by the House of Habsburg (Becker et al. 2016).

The major influence of the empire in Eastern Europe began when Ferdinand of Austria was elected King of Hungary, Croatia, and Bohemia. It was at this time that the Austrians had to seriously contend with the force of the Ottoman Empire. The Habsburgs drove further into Eastern Europe, each time pushing the Ottoman Empire back even further. In 1683, the Ottomans failed to capture Vienna for a second time which marked the beginning of the Habsburg dominance in Eastern Europe (Becker et al. 2016).

One of the defining characteristics of the empire is that even though the empire was composed of many states and cultures, the ruling class largely respected and protected its citizens. The citizens recognized this and considered the bureaucracy to be reliable, honest, and hard-working. The laws were fair and efficient, and it was the legal system that served as a uniting factor throughout an empire composed of many different ethnic groups. The ruling style of the empire was decentralized until the rule of Maria Theresa in the mid-18th century. She established a set of governors that would supervise local administrations throughout the empire. Once a new territory fell under Habsburg rule, the old administration was abolished and a new Austrian governor would be installed. This governor was charged with establishing a new local administration, often filling roles with natives that had been sent for training in Vienna. Due to the competency of the Austrian trained administration, these institutions sometimes remained in place even after a territory became autonomous (Becker et al. 2016).

Maria Theresa's son, Josef II, carried on this legacy and enhanced her policies by instilling legal reforms, ending censorship, and promoting education. Josef also went on to found institutions of social and medical care and laid the foundations for infrastructure development. Josef gave subsidies to fund infrastructure projects such as railroads in less developed parts of the empire in order to encourage integration (Becker et al. 2016). This included highway development and improvements in the navigability of the Danube River and the Save and Kulpa Rivers in Hungary. By 1800, 7,460 km of highways were in existence throughout the empire. By WWI, 40,000 km of railways were built throughout the empire. Connecting the financial heart of Vienna to major cities throughout the empire was important for the unity of the empire as well as for the transportation of goods and services which would lay the foundation for economic growth (Good 1984).

Throughout the 18th century, the empire made a conscious effort to industrialize and develop. Mercantilist policies were enacted to develop the agricultural regions of the empire. In the Bohemian lands, subsidies were given to machine builders and inventors were given exclusive production privileges for several years. The textile and iron industries also experienced lessening restrictions. Political advisors tried to encourage the movement away from agriculture by encouraging manufacturing in Hungary and the less developed regions of Austria. Plans were made to increase Hungarian productivity in the areas of textile, leather, paper and wood products, and iron manufacturing. Tariff barriers were reduced or eliminated (Good 1984).

In the 18th century, the economic development of the empire was split between west and east. The western portion of the empire was much more industrialized while the eastern portion was more agrarian. According to several historians, economic development started in the western portion of the empire and slowly moved east. During this time, the western portion of the empire

had several strong industries. These industries included a strong linen/woolen textile industry as well as a glass industry and chemical industry. Austria was a strong center of mining and metallurgy. By the late 1700's, Austria was one of the largest producers of pig iron in all of Europe with the Styrian region in Austria producing more iron than all of England. At this time, the Eastern portion of the empire was specialized in grain and livestock production (Good 1984).

In Hungary, the main strength was the flour milling industry. Croatia-Slavonia had some grain production but it could not compete with the output from Hungary. This pushed the Serbian region towards livestock production. In Transylvania, the main industry was mining and metallurgy. The expansion of the rail and credit networks in the region allowed Transylvania to have easy access to Budapest. This stimulated the industry further allowing the region to become a major exporter of coal, pig iron, and timber. In the years leading up to WWI, Transylvania and Croatia-Slavonia had much larger industries and industrial output than their neighbors: Romania, Serbia, and Bulgaria (Good 1984).

A turning point for the empire occurred in 1866. In 1866, Austria was defeated and considerably weakened in the Austrian-Prussian War. This forced Austria to relinquish control of Lombardy-Venetia to Italy and with the dissolution of the German Confederation, it also lost its status as the leader of the German speaking states. The war left Austria in great deal of debt (Republic of Austria Parliament 2020). It was around this time that the emperor, Franz Joseph, decided to reexamine the empire's affairs. By this time there was unrest in the empire as many ethnic groups, especially the Hungarians, were demanding equal status with the Austrians. In fear of losing even more power, the Austrians engaged in negotiations with the Hungarians which ended in the *Ausgleich* of 1867. This compromise regulated the relations between Austria and Hungary and created the Austro-Hungarian Empire. Through the negotiations, it was decided that the Hungarians would have full internal autonomy. The two powers would remain united for war and other foreign affairs and would operate under a customs union which would be reevaluated every ten years. Austria and Hungary would both have their own constitutions, with their own governments, and parliaments. The parliament was composed of an appointed upper house and an elected lower house. They both remained under the rule of a common emperor, his court, and ministers of foreign affairs and war. Franz Joseph was crowned the King of Austria-Hungary and Gyula Andrassy was named the first prime minister of Hungary (Republic of Austria Parliament 2020).

Even under the newly reformed empire, many of the laws protecting citizens' rights remained. The Fundamental Laws, which became known as the December Constitution, were instated in 1867 and lasted until the dissolution of the empire. These laws ensured equality, freedom of speech, press and assembly and protected the rights of minority groups. They proclaimed that "all nationalities in the state enjoy equal rights, each one having an inalienable right to the preservation and cultivation of its nationality and language." The equal rights of all languages in local use were guaranteed by the state in schools, administration, and public life (Republic of Austria Parliament 2020).

The history of Transylvania and Serbia is complicated, political, and even controversial. In the next section, we discuss the key distinguishing characteristics of the regions to shed light on the influence of the empire in these regions.

3.1 Transylvania

Transylvania was historically governed by princes and a Diet. The Diet was an administrative body composed of Hungarian nobility, German Saxons, and Szekely Hungarians. This group often referred to themselves as the three nations. This group decided on all economic, legal, and military matters even though the majority of the population in the area was ethnically Romanian. The Romanians in the area held little power; they were mostly peasants that worked under serfdom for Hungarian noblemen. As they were not fairly represented by legislative bodies, clashes and protests between the Romanians and Hungarians often ensued (Encyclopedia 2020).

After Austria defeated the Ottoman Empire in 1684, the Habsburg monarchy started to impose their rule in Transylvania. They strengthened the government and promoted the Catholic Church. In 1711, the Transylvanian princes were replaced by Habsburg governors. In 1765 the

Grand Principality of Transylvania was formed. This granted Transylvania a special status as an independent state within the Habsburg monarchy (Britannica 2020a). This time period, however, was not peaceful; the area experienced civil unrest due to competing interests between the large ethnic groups. In 1784, the Romanians revolted against the Hungarians, demanding political and religious equality with other ethnic groups. The rebellion was crushed, and no reforms were made. In 1791, the Romanians again demanded religious equality from the Habsburg emperor to no avail. In 1848, during the revolutions, the Hungarian parliament proposed the union of Transylvania with Hungary. Romanians were at first optimistic about the union because they hoped that it would bring much needed reforms. However, they quickly realized that the Hungarians would not support Romanian national interests. A Romanian Diet was formed which requested proportional representation in the Transylvanian Diet along with an end to the social and ethnic oppression of Romanians. The Saxons supported the Romanians as they also opposed the union with Hungary for fear that they would lose their class status in Transylvania. The vote to join Hungary was pushed through regardless of the opposition from many groups. This move led to war within the area between the Romanians/Saxons and the Hungarians. The Hungarians were eventually defeated but requested that national borders be drawn along ethnic boundaries, giving them control of Transylvania. The Austrians declined this request because they favored the creation of a Romanian province which would unite Transylvania, Banat, and Bukovina (all areas of the Habsburg empire with high concentrations of Romanians). The empire at the time was trying to balance civil unrest along ethnic lines with the desire to maintain a united empire. They feared that if not supported, the Romanians would also desire to separate from the empire. The year following the revolution was characterized by many small battles and civil unrest which was eventually quelled by the Austrians. After the wars ceased, the Austrians imposed a repressive regime on Hungary and ruled Transylvania through a military regime, making German the official language. The Austrians acknowledged the Romanian citizens, giving them land to farm but living conditions were generally poor (Encyclopedia 2020).

The start of the Austro-Hungarian empire in 1867 marked the end of autonomy for Transylvania and Serbia. As a result of the Ausgleich, Transylvania was no longer considered a separate state, it was now a province ruled by the Hungarian Diet. During this time, Romanians were oppressed under Magyarization, or the process of Hungarian cultural assimilation (Encyclopedia 2020). However, this time period was not all bad for the Transylvanian region. The Austro-Hungarian empire brought forth infrastructure development and the boom of industry in the area. Prior to 1867, Transylvania did not have a rail network. By 1910, rail density in Transylvania was 96 km per 100,000 people. This level of development was comparable to the more developed regions of Austria and far exceeded the established rail networks on the other side of the border. For reference, in Romania rail density averaged around 49 km per 100,000 people at this time (Good, 1984). These types of projects were financed by two Austrian companies, the Staatseisenbahn- Gesellschaft and the Danube Steamship Company. These companies not only invested in railways but also waterways and coal mining industries in the Hungarian empire. In addition to infrastructure development, banking and capital networks were also developed by the late 1860's. There were six main bank branches throughout the empire, one of which was located in Brasov (Transylvania). From 1890-1913, the eastern part of the empire experienced an industrial revolution and an emergence of industry. This timing was concurrent with the diffusion of the rail and credit network. During this time, capitalism spread throughout the eastern regions and Austrian capital financed large investments in infrastructure and the expansion of the agriculture and food processing industries. Some of the innovation that occurred included the mechanization of farming practices as well as the introduction of artificial fertilizers (Good 1984). After World War I and the collapse of Austria-Hungary, the deputies of Transylvanian Romanians declared the union of Transylvania with Romania on December 1st, 1918.

3.2 Serbia

The association of Serbia with the Habsburg empire began during the Great Serb Migration, a time when many Serbians fled Ottoman rule and settled into the Habsburg Monarchy. During this

time, Serbians settled in the lower half of Hungary with a large portion also settling in the Vojvodina area of northern Serbia. The Habsburgs provided these Serbians special rights, recognizing them as their own nation within the empire, in exchange for the provision of a defense against potential invaders, namely the Ottoman Empire. In 1716, the Austrian government temporarily forbade settlement in the area by Hungarians while allowing German speakers to move in to repopulate the area and develop the agricultural sector. During 1848, the area experienced civil unrest between Serbs and Hungarians. Following the defeat of the Hungarians in 1849, a new administrative region called the Voivodeship of Serbia and Banat of Temeschwar was formed. This region was an Austrian crown land but was autonomous. In 1860 this was abolished, and it again became a Hungarian crown land at the decision of Franz Joseph, the then-emperor of Austria-Hungary. As in Transylvania, the region experienced great economic growth during empire rule, however ethnic relations were tense during this time (Britannica 2020b).

3.3 Summary

From this discussion, we infer several hypotheses on the lasting effect of the historic and cultural ties with the Habsburg empire. The first hypothesis describes the view of the empire in Romania and Serbia. We propose that Romanians and Serbians positively view their association with the former Habsburg empire and, as an extension, there exists a positive relationship between countries that share this affiliation. This stems from the fact that the empire frequently protected both Romanians and Serbians from their oppressors while also allowing them to enjoy long periods of autonomy. In addition, the empire promoted the development of fair and well-functioning institutions while also investing heavily in infrastructure. This led to great economic growth in these former empire territories. Even though periods of time were characterized by ethnic clashes, the length of independence should outweigh any short-term negative associations with the empire that may have occurred. For these reasons, we expect to find a greater number of investments from countries affiliated with the empire in former Habsburg territories. The best identification of the effect of culture on FDI comes from local variations in culture which should be localized to the former empire border.

The second hypothesis builds on the first by proposing that some historical ties may be stronger than others. Throughout history, Romanians and Serbians were often oppressed by the Hungarians and as a result often engaged in battles over territories. Pockets of Romania and Serbia still have significant Hungarian minority populations. In Romania specifically, cultural and political tensions between Romanians and Hungarians still exist. It is possible that Hungarian investors would be more drawn to areas with large Hungarian populations due to language and cultural similarities. Since Austrian capital financed most of the infrastructure and industry development in the former empire territories, we propose that Austrians formed the strongest ties in these areas.

IV. Data

The primary data used in the analysis come from fDi Markets, a database maintained by the Financial Times, which tracks cross-border greenfield investments from 2003 to 2018. This database is unique in that it identifies many details about each investment project. It provides the source and location of each investment, in most cases down to the city level. It also provides the industry of each investment project as well as the size of the investment as measured by the amount of capital invested and the number of jobs created. From 2003-2018, there were a total of 2,221 projects identified in 217 cities in Romania and 910 projects identified in 115 Serbian cities. Estimation of the model requires the precise location of each city.

We use GeoNames to obtain the geographic coordinates and the population of each city in the data set. In addition to the cities with investment projects, we also include cities in Romania and Serbia that did not receive any foreign investment to avoid any selection issues. We include all cities in Romania and Serbia that are considered seats of administrative divisions. In addition

to these cities, we also include all populated places with 5,000 or more individuals. The average population of cities with foreign investments is 6,113. We choose to include all populated places with populations above 5,000 individuals in order to capture all similarly sized cities that may have also been considered for investment. This results in a total of 3,018 cities in Romania and 157 cities in Serbia, for a total of 3,175 cities in our sample. After obtaining the city coordinates, we used ArcGIS software to map the cities, the current country borders, and the historical empire border. We use this software to calculate the geodesic distance from each city to the nearest point on the former empire border in kilometers.

The analysis is performed at the city level. To form the dependent variable, we construct a measure of FDI per capita. To do this, we calculate the number of “Habsburg” projects in city i , from 2003-2018. This measure is then scaled per 10,000 individuals as this corresponds to the average population of the cities in the sample. We define a Habsburg project as any investment coming from Austria, Hungary, Czech Republic, Slovakia, Slovenia, Croatia, or Bosnia-Herzegovina. These countries were selected since they were completely contained within the boundaries of the Habsburg empire from 1867-1918, the period of time that regions of Romania and Serbia also officially belonged to the empire.

The analysis also requires data on location-specific characteristics that may impact the allocation of foreign direct investment. Ideally, these data would be available at the city level; however, this is not readily available for every location in the data set. The smallest statistical unit for which we can collect data is the municipal or district level.

In the European Union, each member country is divided into various regions for statistical purposes. This classification system is called the Nomenclature of Territorial Units for Statistics, or NUTS for short. Eurostat specifies three NUTS levels in each country. These levels are based on existing institutional divisions within each country as well as on certain population thresholds. The largest classification is NUTS1 and the smallest classification for which data is collected is NUTS3. The average population of the NUTS3 division is between 150,000 to 800,000 individuals. All Romanian data on economic and demographic characteristics are obtained from Eurostat at the NUTS3 level as of 2016, the most recently published Romanian data. Serbia is not in the European Union; however, it is a candidate country and therefore is in the process of transitioning to the NUTS classification system for data collection. The smallest administrative unit in Serbia is a district. Serbia currently has 24 districts that are proposed to be equivalent to the NUTS3 classification. All Serbian data come from a report on the municipalities and regions of Serbia published by the Statistical Office of the Republic of Serbia. We draw on data from the 2017 publication of this report which provides information for Serbian districts as of 2016.

In Romania, the location characteristics considered are land area measured in square kilometers and the following population characteristics: population density per square kilometer, median age, and GDP per capita. We also include information on total employment, and employment by industry. The industries considered are manufacturing, IT, and agriculture. Since educational characteristics are not available at the NUTS3 level, we also include information on the total number of professional, scientific, or technical establishments and the number of EU trademark applications in an effort to capture human capital differences across regions.

We obtain similar regional, economic, and demographic characteristics for Serbia. For Serbia, we examine statistics on land area measured in square kilometers, as well as the following population characteristics: population density per square kilometer, average age, average net salary per employee, as well as the average annual number of workers employed in various industries. The industries included are agriculture, manufacturing, finance and insurance, and real estate. These data serve to establish the industrial profile of the regions in the analysis.

V. Identifying the Effect of Culture on the Allocation of FDI

In this study we implement a spatial regression discontinuity design to test whether there is a discontinuous increase in Habsburg investment at the former empire border in present day Romania and Serbia. This method allows an identification of within country variation in the allocation of FDI that can be directly attributed to cultural and historical differences. The former

empire had a boundary which split present day Romania and Serbia in half. We present evidence that this empire affiliation had persistent cultural effects on the people living in these former empire regions. Perhaps the most important cultural effect is the formation of historical business ties between countries sharing an affiliation with the former Habsburg empire. We take advantage of this variation in culture along the no longer existing boundary, to identify differences in the location of FDI at the border. Cities on either side of this boundary share a common language and religion. Additionally, cities located on either side of this border have shared common institutions for over 100 years. These features allow us to separate the effect of culture from the effect of institutions, language, and religion which are often entangled in other definitions of culture used in previous studies examining the effect of culture on FDI. We follow the literature in implementing a one-dimensional forcing variable, distance to the former empire border in kilometers. In order to estimate how culture impacts FDI at the former empire border, we estimate the following equation:

$$FDI_{Habsburg_i} = \beta_0 + \beta_1 Empire_i + f(D_i) + Empire_i f(D_i) + c_j + \epsilon_i \quad (1)$$

where $FDI_{Habsburg_i}$ represents the number of Habsburg projects per 10,000 individuals in city i . $Empire_i$ is a dummy variable which is equal to one if city i is located within a region that formerly belonged to the Habsburg empire. D_i represents the distance from city i to the historical border measured in kilometers. C_j represents location country fixed effects which control for any country-specific factors, such as formal institutions, language, and religion which could all impact the allocation of FDI today. We present two estimations of this model. In the first estimation, we present results from a local linear approach where $f(D_i) = D_i$. In this estimation, we follow the literature and use an optimal bandwidth of 84.84 kilometers, as determined by the methodology proposed by Calonico, Cattaneo, and Titiunik (2014). In the second estimation of the model, we include various orders of polynomials of the distance variable as controls which is captured by $f(D_i)$. The coefficient of interest in all of these estimations is β_1 , which reflects the role of Habsburg culture on FDI.

This empirical analysis requires several important assumptions. The first assumption is that if Habsburg investment is an important determinant of FDI, there should exist a discontinuity, or a jump, in foreign investment coming from former Habsburg investors as one moves into the former Habsburg territory. The second assumption is that foreign investment coming from the rest of the world does not change discontinuously at the border. This is an important feature because if foreign investment coming from the rest of the world also jumps at this border, it is likely that these regions provide better business environments for foreign investors. In order to attribute the change in investment patterns to culture, it must be the case that only Habsburg investment is impacted at the former empire border. The final necessary assumption is that any other factor that may impact the spatial allocation of foreign investment is continuous at this border. If these assumptions hold, it is reasonable to conclude that any increase in Habsburg FDI at the border can be attributed to a Habsburg cultural effect. To test these assumptions, we create a similar measure of FDI per capita by calculating the number of “Rest of the World” investments in city i , from 2003-2018. This measure is also scaled per 10,000 individuals for consistency. We replace the dependent variable in equation 1 with FDI_{ROW_i} to formally test the first assumption. We repeat this process with each of the location characteristics collected to test the validity of the final assumption.

5.1 Graphical Analysis

Before presenting the results from the regression model, it is important to examine the distribution of Habsburg investment near the border. Figure 1 presents the density of investment projects in Romania and Serbia. Figure 1a depicts projects from Empire investors. While there are clearly some investments that are being drawn to the capital city of Bucharest, it appears that

Habsburg investments are almost completely contained within the former empire territory. Figure 1b provides the density of projects from the rest of the world. In contrast to previous results, there is no clear pattern for these investors. These investors appear to be geographically distributed throughout both countries, with the largest cities drawing more investments. Figure 2 plots the location of Habsburg and ROW investments respectively, with larger circles representing a larger number of projects per capita. These figures present similar evidence for Habsburg investors. Empire investment projects occur almost exclusively in former empire territories while ROW projects are more or less evenly distributed throughout Romania and Serbia.

Figure 1: Density of FDI.

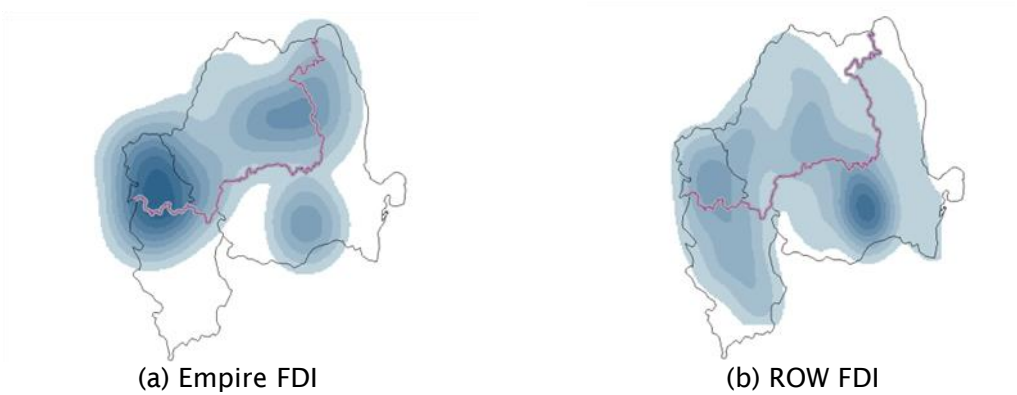
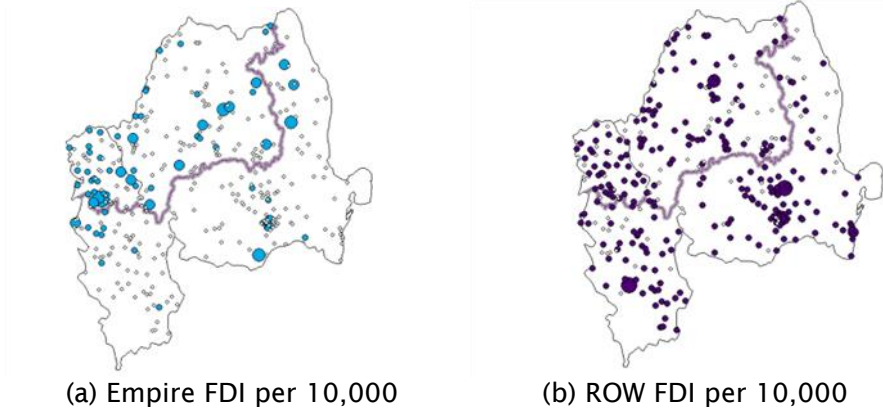


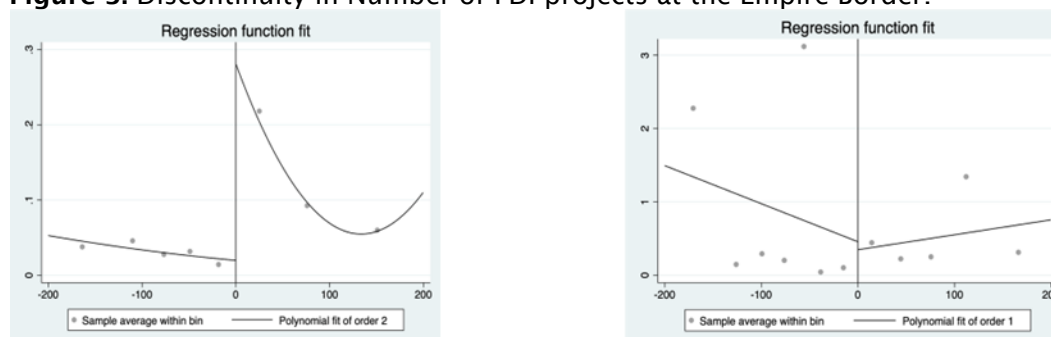
Figure 2: Location of FDI Projects.



Next, we present the graphical evidence of a discontinuity. Figure 3a plots the average number of Empire FDI projects per 10,000 individuals over various distances from the border. The horizontal axis indicates the distance in kilometers from the empire border. Positive values represent the distance from the border to cities within the former empire territory, while negative values represent the distance from the border to cities that were never in the empire. While the average number of Habsburg FDI projects is relatively low across Romania and Serbia, there is a striking jump in the average number of Habsburg projects that is only evident within 100 kilometers of the border in the former empire territory. Figure 3b plots the average number of ROW projects per 10,000 individuals over various distances from the border. In contrast to the previous figure, there is no evidence of a discontinuity in projects from the rest of the world. ROW investments are flat across the former empire border. The only spikes in ROW projects seem to correspond with larger cities that fall on either side of the border. This establishes the fact that Habsburg investors

are being drawn to the former empire territories of Romania and Serbia. Since this pattern does not exist for investors from the rest of the world, these graphs provide initial evidence that the discontinuity found is not solely indicative of a better business environment for all foreign investors.

Figure 3: Discontinuity in Number of FDI projects at the Empire Border.



(a) Average Empire FDI per 10,000

(b) Average ROW FDI per 10,000

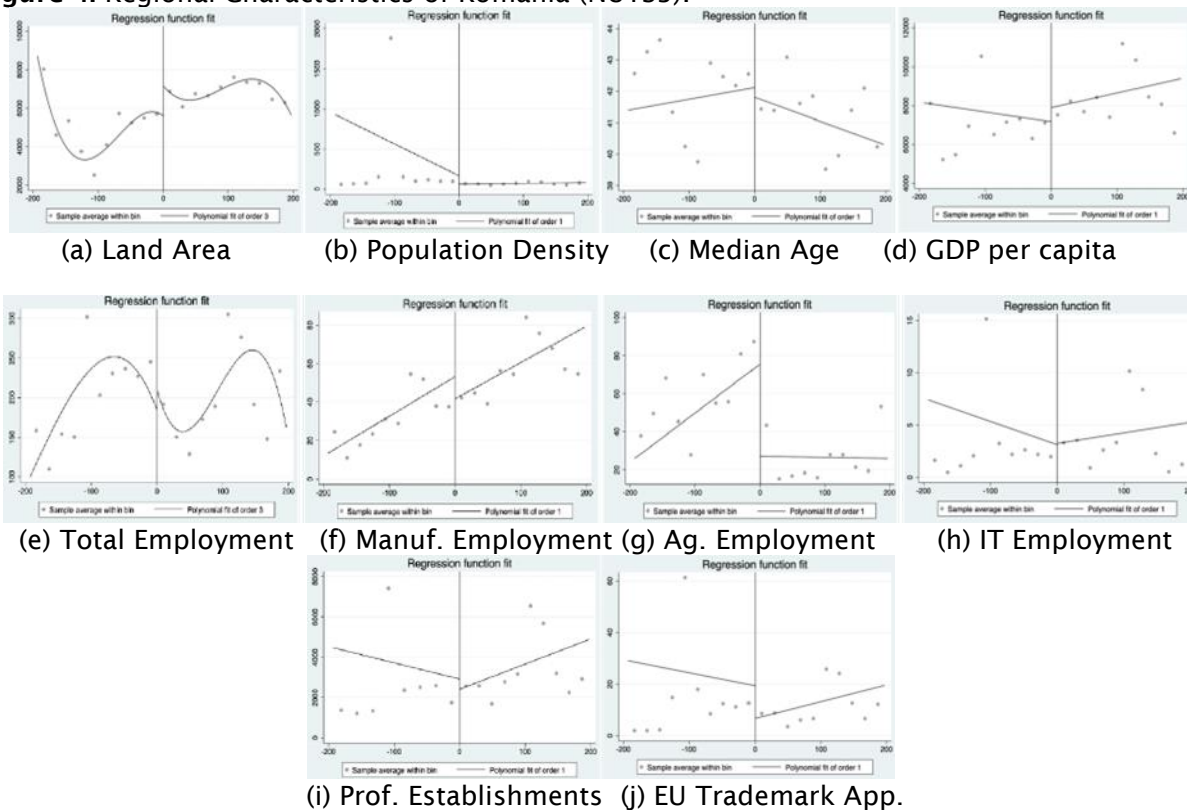
Note: These figures portray how FDI varies across the former empire border. The vertical axis denotes the average value of FDI projects per 10,000 individuals, while the horizontal axis denotes the distance in kilometers from the border. Negative values represent the distance to the border from cities that were never in the former empire, while positive values represent the distance to the border from cities that were located in the former empire territory.

A valid regression discontinuity design requires that all other factors that may impact the spatial allocation of FDI in both Romania and Serbia remain continuous across the former empire border. We present graphical evidence of this by country as these statistics are drawn from different sources for Romania and Serbia. The statistics presented are as of 2016, the most current year available for both countries.

When examining the factors that may impact the allocation of FDI in Romania, it is evident that most demographic and industry characteristics are continuous across the border. Demographic characteristics such as median age, population density, and GDP per capita are continuous, which indicates that there are no significant human capital differences across regions. While it would be preferable to have data on the educational characteristics of the population in these areas, these data are not available. More compelling evidence of this is reflected in the graphs depicting the number of EU trademark applications, IT employment, and the number of professional, scientific, or technical establishments. Each of these graphs provide evidence that no trend or discontinuity exist across the former empire border, suggesting that the educational characteristics of the individuals living in these areas do not differ significantly. There are two important industrial characteristics to note. First, there is an observable trend in manufacturing employment across the border. Second, there is a significant difference in agricultural employment across the border. These differences in the industrial characteristics of the regions could be persistent effects of the Habsburg empire affiliation. Under Habsburg rule, the empire invested heavily in the development of industry and infrastructure, especially in the eastern portions of the empire. Towards the end of the 19th century, the Transylvanian area no longer focused on agricultural production but instead focused on producing timber and iron (Good 1984). The affiliation with the Habsburg empire may have propelled the former empire territory towards other industries while the non-empire territory may have lagged behind. Interestingly, differences in economic development as captured by the GDP per capita and other measures of the industrial employment of individuals living in these areas, do not persist. These factors, however, still do not explain the discontinuity observed in the number of Habsburg projects. The top industries of investment for Habsburg investors are real estate and financial services. This means that the trends in manufacturing and agricultural employment alone can not explain the pattern of Habsburg investment. While agricultural employment is significantly lower in the former Habsburg territory, this factor does not seem to affect the allocation of FDI from

the rest of the world, as there is no difference in the amount of FDI coming from the rest of the world across this border. This suggests that Habsburg investors are being drawn to areas where they hold cultural and historic business ties.

Figure 4: Regional Characteristics of Romania (NUTS3).



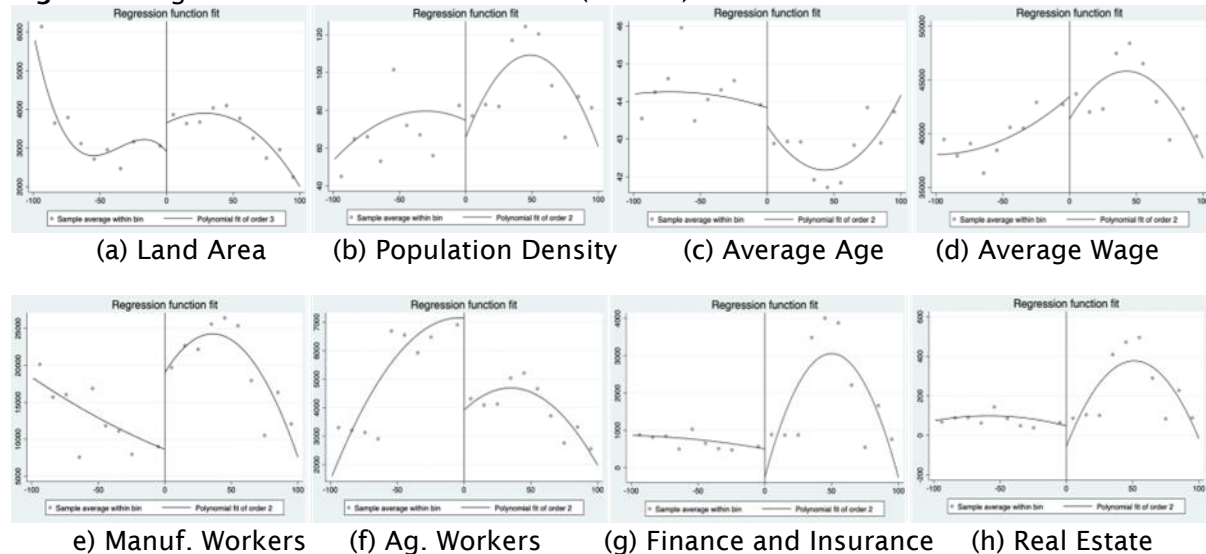
Note: These figures portray how regional and economic characteristics in Romania vary across the former empire border. The vertical axis denotes the average value for a given variable, while the horizontal axis denotes the distance in kilometers from the border. Negative values represent the distance to the border from cities that were never in the former empire, while positive values represent the distance to the border from cities that were located in the former empire territory.

In Serbia, the capital city of Belgrade falls on the former Habsburg empire boundary. In addition, five large cities fall within 5 kilometers of this border. It is likely that some investors may choose to locate in these cities in order to be in close proximity to Belgrade. In order to prevent these large cities from skewing the results, we drop them from the main analysis. The following graphs depict factors that may influence the spatial allocation of FDI in Serbia, excluding Belgrade and the five large cities that were dropped from the analysis.

The graphs depicting Serbian characteristics present a similar story to that of Romania. In Serbia, there is a statistically significant difference in manufacturing and agricultural employment across the former empire border. This again indicates some evidence of the Habsburg influence on the industrial development of the region. While these graphs depict evidence of a few discontinuities in the economic and demographic characteristics of the regions of Serbia across the empire border, none of these characteristics explain why Habsburg projects per capita are higher in the former empire region of Serbia. As in Romania, the main industries that empire investors are associated with are service industries; primarily real estate and financial services. Investors from the rest of the world are also associated with service industries but they also invest in the automotive and manufacturing industries. Yet, even these investors are equally likely to invest along either side of the border. Furthermore, when including all cities except for Belgrade

in the analysis, there is no evidence of a discontinuity in any of the characteristics that may affect the allocation of FDI in Serbia, which provides a further indication that any effect captured by the model can be attributed to a Habsburg cultural impact. These graphs are included at the end of the paper.

Figure 5: Regional Characteristics of Serbia (District).



Note: These figures portray how regional and economic characteristics in Serbia vary across the former empire border. The vertical axis denotes the average value for a given variable, while the horizontal axis denotes the distance in kilometers from the border. Negative values represent the distance to the border from cities that were never in the former empire, while positive values represent the distance to the border from cities that were located in the former empire territory. Belgrade and five surrounding cities are excluded from this analysis.

VI. Results from the Regression Discontinuity Models

The main results of this analysis come from estimations including all cities in Romania and Serbia with populations of at least 5,000 individuals. It is important to include all possible cities that could have been selected by foreign investors to avoid any selection bias. However, once accounting for these additional cities, the sample size increases from 326 cities to 3,175 cities. For this reason, it is important to verify that the main results obtained from the model are not solely being driven by an increasing sample size. Before presenting the main results of the analysis using the full data set, we present the results for the subset of the data that features only the cities that were selected for investment. Table 1 presents these results. The results indicate that there are between 1.2 and 1.5 additional empire projects per 10,000 individuals at the former empire border. These results are robust even when including the five cities surrounding Belgrade. Results from an estimation including these five cities are presented at the end of the paper.

Table 2 reports the main estimation results of the analysis using Equation (1) and $FDI_{Habsburg_i}$ as the dependent variable. In this table, we only report the estimate of β_1 , the coefficient on the empire indicator variable, which measures the empire treatment effect that we capture with the spatial regression discontinuity design. The treatment effect captured is the estimated discontinuity in empire investments at the border. Each column in the table represents a separate estimation of the same equation. In the first three columns, we present results using the full sample and various orders of polynomials of the distance to the border as control variables. The fourth column presents the results from a local linear approximation of the equation with a

bandwidth of 84.84 kilometers on either side of the border. This optimal bandwidth is obtained using the methodology proposed by Calonico, Cattaneo, and Titiunik (2014).

Table 1: Empire Effect on Empire Investments for Selected Cities.

$FDI_{Habsburg_i}$	Polynomial Models			Local Linear
	2nd Order	3rd Order	4th Order	
Estimate	1.298**	1.443*	1.327*	1.490*
Std. Error	0.647	0.866	0.746	0.858
Observations	326	326	326	130
Bandwidth				59.66

a) Note: This table presents estimates of the effect of Habsburg empire affiliation on the number of Habsburg investments per 10,000 individuals. Each column represents a different estimation of equation 1. Columns 1-3 present the estimates of the discontinuity in Habsburg investments at the former empire border using various orders of polynomials in distance from the border as controls. Column 4 uses a local linear approximation with an optimal bandwidth of 59.66 kilometers. Country fixed effects and robust standard errors are used in every estimation. These estimations feature only the cities that were selected for foreign investment. The analysis excludes Belgrade and five other surrounding cities.

b) $p < 0.10^*$, $p < 0.05^{**}$, $p < 0.01^{***}$

Table 2: Empire Effect on Empire Investments.

$FDI_{Habsburg_i}$	Polynomial Models			Local Linear
	2nd Order	3rd Order	4th Order	
Estimate	0.242**	0.311**	0.326**	0.277**
Std. Error	0.107	0.145	0.144	0.118
Observations	3175	3175	3175	1689
AIC	6403.268	6405.838	6405.425	
Bandwidth				84.84

a) Note: This table presents estimates of the effect of Habsburg empire affiliation on the number of Habsburg investments per 10,000 individuals. Each column represents a different estimation of equation 1. Columns 1-3 present the estimates of the discontinuity in Habsburg investments at the former empire border using various orders of polynomials in distance from the border as controls. Column 4 uses a local linear approximation with an optimal bandwidth of 84.84 kilometers. Country fixed effects and robust standard errors are used in every estimation. The analysis excludes Belgrade and five other surrounding cities.

b) $p < 0.10^*$, $p < 0.05^{**}$, $p < 0.01^{***}$

Table 3: Polynomial Models over Various Bandwidths.

$FDI_{Habsburg_i}$	2nd Order Polynomial				
	Full Sample	126 km	Optimal	56 km	42 km
Estimate	0.242**	0.309**	0.327**	0.300**	0.075
Std. Error	0.107	0.142	0.151	0.135	0.105
Observations	3175	2389	1698	1111	795

a) Note: This table presents estimates of the effect of Habsburg empire affiliation on the number of Habsburg investments per 10,000 individuals. Each column represents a different estimation of equation 1 using various bandwidths. A second order polynomial in distance and country fixed effects are used as controls in the estimation. Robust standard errors are used in every estimation. This analysis excludes Belgrade and five other surrounding cities.

b) $p < 0.10^*$, $p < 0.05^{**}$, $p < 0.01^{***}$

All model estimates show statistically significant results that show direct evidence of a sharp increase in empire projects per 10,000 individuals at the border. The magnitude of this increase ranges from 0.24 to 0.32 additional empire investments per 10,000 individuals. This is robust to various specifications of the model and various bandwidths. In Table 3, we present results from

estimations of the model including a second order polynomial of distance as a control over various bandwidths. These bandwidths range from the full sample size of approximately 200 kilometers, to 42 kilometers from the former Habsburg border. Only in the narrowest bandwidth of 42 kilometers does the estimate lose its significance. All other results presented are statistically significant at the 5 percent level and are stable, with around 0.3 additional Habsburg investments per 10,000 individuals. In Table 4, we present the results from a local linear approximation of the model again using the same range of bandwidths. In this estimation, the results are again stable and statistically significant, even using the narrowest bandwidth. These tables provide evidence that the main results of the model are not sensitive to bandwidth or model choice.

Table 4: Local Linear Models over Various Bandwidths.

$FDI_{Habsburg_i}$	Local Linear				
	Full Sample	126 km	Optimal	56 km	42 km
Estimate	0.154**	0.220**	0.277**	0.313**	0.376**
Std. Error	0.060	0.091	0.118	0.149	0.174
Observations	3175	2389	1698	1111	795

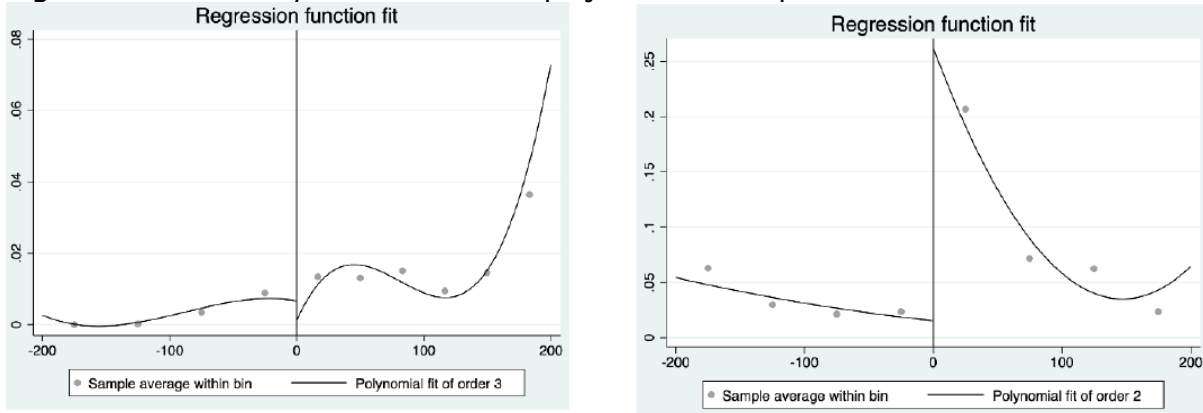
a) Note: This table presents estimates of the effect of Habsburg empire affiliation on the number of Habsburg investments per 10,000 individuals. Each column represents a different estimation of equation 1 using various bandwidths. These estimates are based on a local linear approximation with country fixed effects as controls. Robust standard errors are used in every estimation. This analysis excludes Belgrade and five other surrounding cities.

b) $p < 0.10^*$, $p < 0.05^{**}$, $p < 0.01^{***}$

6.1. Alternative Specifications of the Model

Throughout Habsburg rule, Romanians and Serbians often engaged in disputes with their Hungarian neighbors. The regions of Romania and Serbia formerly belonging to the Habsburg empire still maintain large Hungarian populations. However, the relations of Romanians and Serbians with these groups are still strained. In Romania, the large Hungarian groups of Transylvania still demand their independence. For this reason, it is important to check that the discontinuity in Habsburg investment is not solely being driven by Hungarian investors that are locating in regions where Hungarian is spoken. Figure 6a shows the average number of FDI projects made by Hungarian investors per 10,000 individuals. In this figure, there is no evidence of a discontinuity at the Habsburg border. This is an important finding because it suggests that the main results of the model are not solely driven by Hungarian investment. Interestingly, there is evidence that investment gradually increases in the former empire territory, especially as distance from the border increases. This indicates that Hungarian investors may be locating in regions that are primarily Hungarian. Since the average number of Hungarian projects increases with distance from the empire border, it is likely that Hungarian investors are locating in cities that are closer to the border with Hungary. This is consistent with my second hypothesis. Due to potential negative associations that Romanians and Serbians may hold for Hungarians, Hungarian investors may choose to locate in areas that are predominantly Hungarian, where such investments may be viewed more positively by the local community. Figure 6b shows the average number of FDI projects per 10,000 individuals from all Habsburg investors excluding Hungary. Even after excluding the Hungarian investors, there is clear evidence of a discontinuity at the Habsburg border. In fact, the graph looks almost identical to the graph using the main investment group. This reinforces the fact that the results are capturing evidence of a Habsburg cultural effect.

Figure 6: Discontinuity in Number of FDI projects at the Empire Border.



(a) Average Hungarian FDI per 10,000

(b) Average Empire FDI excluding Hungarians

Note: These figures portray how FDI varies across the former empire border. The vertical axis denotes the average value of FDI projects per 10,000 individuals, while the horizontal axis denotes the distance in kilometers from the border. Negative values represent the distance to the border from cities that were never in the former empire, while positive values represent the distance to the border from cities that were located in the former empire territory.

Across the empire’s reign, Austria served as the heart of the Habsburg empire. Historically, Austrian leaders managed the transition to Habsburg rule and it was Austrian capital that invested in infrastructure development and the development of industry in the Eastern regions of the empire. For these reasons, it is likely that Austrians formed stronger historic business relationships in former Habsburg territories than other former Habsburg members. To test this hypothesis, we test the effect of the Habsburg border on the number of Austrian investments per 10,000 individuals. Table 5 presents the results from the two specifications of the model considered in the main analysis. The results are statistically significant for the local linear and second order polynomial estimation of the model, with estimates of approximately 0.09 additional Austrian investments per 10,000 individuals at the border. While the estimates lose some precision when incorporating higher orders of polynomials, this specification of the model suggests that Austrian investors hold important historical and cultural ties to communities in the former empire regions of Romania and Serbia.

Table 5: Empire Effect on Austrian Investments.

$FDI_{Austria_i}$	Polynomial Models			Local Linear
	2nd Order	3rd Order	4th Order	
Estimate	0.0978**	0.077	0.060	0.090**
Std. Error	0.045	0.055	0.056	0.043
Observations	3173	3173	3173	1049
AIC	5679.777	5683.541	5683.288	
Bandwidth				53.54

a) Note: This table presents estimates of the effect of Habsburg empire affiliation on the number of Austrian investments per 10,000 individuals. Each column represents a different estimation of equation 1. Columns 1-3 present the estimates of the discontinuity in Austrian investments at the former empire border using various orders of polynomials in distance from the border as controls. Column 4 uses a local linear approximation with an optimal bandwidth of 53.54 kilometers. Country fixed effects and robust standard errors are used in every estimation. This analysis excludes Belgrade and five other surrounding cities.

b) $p < 0.10^*$, $p < 0.05^{**}$, $p < 0.01^{***}$

VII. Robustness Checks

In this section, we consider two additional robustness checks. In the first check, we include a set of border fixed effects for the main analysis. To implement this approach, we divide the former Habsburg border into 15 equal segments. When calculating the distance from each city to the border, we identify the segment of the border that each city in the sample is closest to. We choose to include these controls in the analysis in order to control for varying regional characteristics along the historical border. For example, in Romania, some regions along the border in the former Habsburg territory, have large groups of Hungarian speakers. Additionally, in Serbia, the capital city of Belgrade falls on the border of the former Habsburg empire. While Belgrade and five other neighboring cities are removed from the main analysis, the estimates could still be capturing some agglomeration effects in the region. We present the results controlling for these factors in Table 6. The estimate remains statistically significant at the 5 percent significance level across all specifications of the model. The estimate is stable ranging from approximately 0.24 to 0.32 additional Habsburg investments per 10,000 individuals.

Table 6: Robustness Check for Empire Effect on Empire Investments.

$FDI_{Habsburg_i}$	Polynomial Models			Local Linear
	2nd Order	3rd Order	4th Order	
Estimate	0.241**	0.313**	0.325**	0.283**
Std. Error	0.108	0.142	0.146	0.121
Observations	3172	3172	3172	1687
AIC	6380.4	6382.749	6382.282	
Bandwidth				84.84

a) Note: This table presents estimates of the effect of Habsburg empire affiliation on the number of Habsburg investments per 10,000 individuals. Each column represents a different estimation of equation 1. Columns 1-3 present the estimates of the discontinuity in Habsburg investments at the former empire border using various orders of polynomials in distance from the border as controls. Column 4 uses a local linear approximation with an optimal bandwidth of 84.84 kilometers. Country fixed effects, border fixed effects, and robust standard errors are used in every estimation. This analysis excludes Belgrade and five other surrounding cities.

b) $p < 0.10^*$, $p < 0.05^{**}$, $p < 0.01^{***}$

Table 7: Empire Effect on Empire Investments using Placebo Borders.

Cutoff	Optimal Bandwidth	RD Estimator	p-value	CI	Obs. Left	Obs. Right
100	38.25	-0.031	0.517	[-0.126, 0.063]	716	2458
75	38.74	0.027	0.307	[-0.024, 0.077]	996	2178
50	42.40	0.034	0.423	[-0.049, 0.116]	1324	1850
25	40.23	-0.026	0.114	[-0.058, 0.006]	1704	1470
0	84.86	0.282	0.02	[0.044, 0.519]	1899	1275
-25	68.92	-0.272	0.142	[-0.634, 0.091]	2112	1062
-50	59.88	-0.066	0.444	[-0.233, 0.103]	2305	868
-75	46.81	0.082	0.29	[-0.07, 0.235]	2501	672
-100	39.5	-0.333	0.139	[-0.774, 0.108]	2700	473

a) Note: This table presents estimates of the effect of Habsburg empire affiliation on the number of Habsburg investments per 10,000 individuals using a local linear approximation. These estimates come from separate estimations of equation 1, using a series of false borders that are located in 25 kilometer increments from the true border, which occurs at $c = 0$. Only the true border provides an estimate that is statistically significant. This analysis excludes Belgrade and five other surrounding cities.

b) $p < 0.10^*$, $p < 0.05^{**}$, $p < 0.01^{***}$

In the final robustness check, we manipulate the location of the Habsburg border to verify whether any other discontinuities exist in the data. If the initial estimate obtained is solely a “Habsburg” effect, there should not be any discontinuity associated with any other “false border”. To test this assumption, we check for evidence of a discontinuity using false borders located in 25 kilometer increments from the true Habsburg boundary. We find no evidence of a discontinuity on either side of the true border, further indicating that the effect uncovered in the analysis can be attributed to a “Habsburg” cultural effect. The results from this analysis are summarized in Table 7.

While these robustness checks provide evidence that the main results are not being driven by other measurable factors, future research should investigate other data sources to improve the model. The model could benefit from the addition of better demographic characteristics including educational profiles of the regions as well as language and other cultural characteristics. The language characteristics would be especially important in proving that empire investors are not only being drawn to territories where a higher proportion of the population speaks a common language. It is well known that the former empire territories in Romania and Serbia still contain large Hungarian groups, however, without good regional data on the languages spoken in these areas, it is difficult to verify whether there is a jump in the number of people speaking Hungarian at this former empire border. It is also important to evaluate whether there exists a jump in the number of people speaking German at this border. Future research should also further investigate the industrial composition of the region and the investors. It would be interesting to examine the patterns of investment by industry and nationality of the investor to determine whether agglomeration characteristics matter for all types of investors.

VIII. Conclusion

This study demonstrates that previous Habsburg empire affiliation significantly influenced the allocation of FDI in the former empire territories of Romania and Serbia today. Comparing the number of foreign investment projects in cities on either side of the long gone Habsburg border, we find a higher number of investments, originating from countries that were also historically affiliated with the Habsburg empire, in former empire territories. We argue that this difference in investment along the former empire border can be attributed to persistent cultural ties formed through historic business relationships. The Habsburg empire made several important contributions to the development of the eastern portions of the empire. Perhaps the most important contributions they made were in the development of infrastructure and industry which we argue led to the development of a historical business relationship which persisted over time.

Using a geographic regression discontinuity design, we present evidence of a sharp increase in the number of Habsburg investments along the former empire border. Specifically, we find an increase of 0.24 to 0.32 additional Habsburg investments per 10,000 individuals in former empire territories. This study provides a unique setting in which to examine the impact of cultural ties since the former Habsburg empire had a border which ran through several present day countries, including Romania and Serbia. This feature allows us to measure the effect of within country variation in culture on FDI. Since cities on either side of the border have shared formal institutions for over 100 years, this methodology allows us to separate a cultural impact of empire affiliation on FDI that cannot be explained by differing institutions. Through the analysis, we present evidence that the number of investment projects from the rest of the world do not change across this border indicating that the former empire territories of Romania and Serbia are not simply offering better business environments for foreign investors. In examining other demographic and industrial characteristics of the regions in the analysis, we find only a few discontinuities in the industrial composition of the territories. These discontinuities are in manufacturing and agricultural employment. The former empire territories have stronger manufacturing sectors and lower agricultural employment today. However, it is unlikely that the industrial composition is driving the main results. The top industries of investment for Habsburg investors are service industries, primarily real estate and financial services. As investors from the rest of the world are also primarily investing in services, industrial composition alone cannot explain the results of the

model. While Romania and Serbia still have large populations of Hungarians throughout the former empire territories, the effect found is not attributed to Hungarian investors locating in Hungarian communities. The main results of the model are robust to the exclusion of the Hungarian group. In fact, we find no discontinuity across the former empire border for Hungarian investors. Rather, we present evidence of Hungarian investment increasing in the former empire territory and increasing in distance, suggesting that Hungarian investors are locating in areas that contain more Hungarians and in areas that are most likely closer to the border with Hungary. Furthermore, we show that a discontinuity still exists when considering only Austrian investors. This is in line with the main hypothesis of the model, since Austrians were most likely to develop the strongest cultural business ties in the area. The main findings of the model are robust to various specifications of the model including using various bandwidths and border fixed effects. Even more compelling, the results are robust to a falsification test using placebo borders located in 25 kilometer increments from the true border. In this test, only the true border provides statistically significant results for the estimate of the increase in Habsburg investment projects at the former empire border.

It is widely recognized in both the economics and international business literature that culture can impact the allocation of FDI. Culture can not only impact the location choice of a foreign investor, but it can also impact the long-term profitability of the foreign firm in the new country. While these implications are presumed, it has been difficult to formally test these assumptions since culture is inherently difficult to measure. Previous research attempts to measure culture through institutions, language, religion, or the Hofstede index, however, these characteristics are typically measured at the country level, making it difficult to disentangle the effect found from any other characteristic that also varies at the national level. By measuring culture through a historic empire affiliation, we provide evidence of the impact that cultural ties can have on FDI that is separate from other factors.

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Appendix

A1: Tables

Table 8: Empire Effect for All Selected Cities.

$FDI_{Habsburg_i}$	Polynomial Models			Local Linear
	2nd Order	3rd Order	4th Order	
Estimate	1.152*	1.181	0.991	1.370*
Std. Error	0.628	0.768	0.627	0.767
Observations	330	330	330	114
AIC	1396.259	1400.243	1399.035	
Bandwidth				51.32

a) Note: This table presents estimates of the effect of Habsburg empire affiliation on the number of Habsburg investments per 10,000 individuals. Each column represents a different estimation of equation 1. Columns 1-3 present the estimates of the discontinuity in Habsburg investments at the former empire border using various orders of polynomials in distance from the border as controls. Column 4 uses a local linear approximation with an optimal bandwidth of 51.32 kilometers. Country fixed effects and robust standard errors are used in every estimation. This analysis includes only the cities that were selected for investment, apart from Belgrade.

b) $p < 0.10^*$, $p < 0.05^{**}$, $p < 0.01^{***}$

Table 9: Empire Effect for All Cities.

$FDI_{Habsburg_i}$	Polynomial Models			Local Linear
	2nd Order	3rd Order	4th Order	
Estimate	0.248**	0.275**	0.276**	0.277**
Std. Error	0.111	0.138	0.133	0.120
Observations	3180	3180	3180	3180
AIC	6403.268	6405.838	6405.425	
Bandwidth				84.21

a) Note: This table presents estimates of the effect of Habsburg empire affiliation on the number of Habsburg investments per 10,000 individuals. Each column represents a different estimation of equation 1. Columns 1-3 present the estimates of the discontinuity in Habsburg investments at the former empire border using various orders of polynomials in distance from the border as controls. Column 4 uses a local linear approximation with an optimal bandwidth of 84.21 kilometers. Country fixed effects and robust standard errors are used in every estimation. This analysis includes all cities in the sample, apart from Belgrade.

b) $p < 0.10^*$, $p < 0.05^{**}$, $p < 0.01^{***}$

Table 10: Effect on Empire Investments Excluding Hungary.

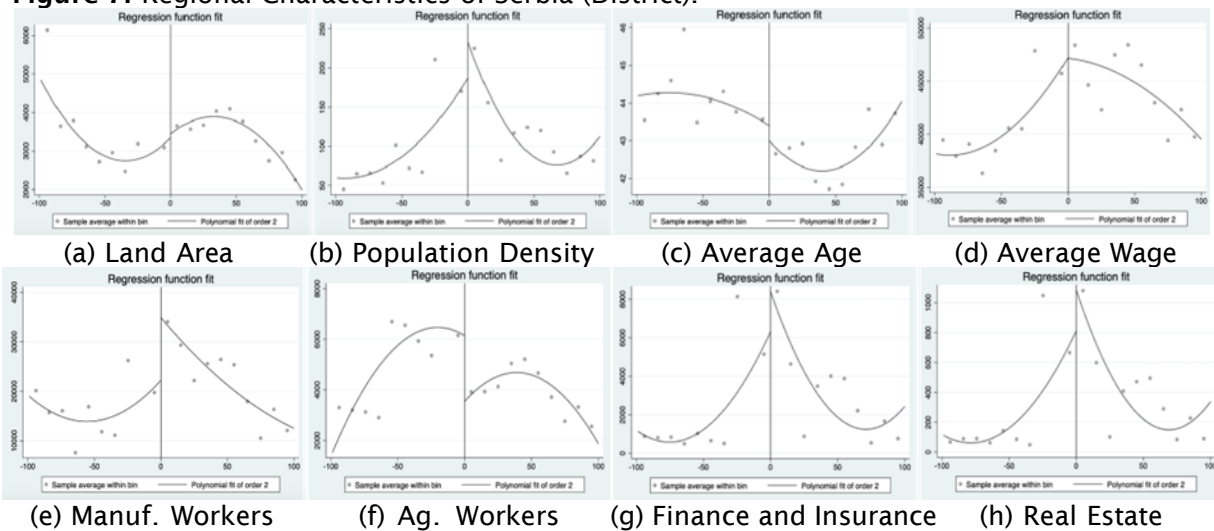
$FDI_{Habsburg_i}$	Polynomial Models			Local Linear
	2nd Order	3rd Order	4th Order	
Estimate	0.236**	0.298**	0.327***	0.266**
Std. Error	0.106	0.144	0.143	0.115
Observations	3175	3175	3175	1700
AIC	6411.842	6414.77	6414.279	
Bandwidth				85.59

a) Note: This table presents estimates of the effect of Habsburg empire affiliation on the number of Habsburg investments per 10,000 individuals. Each column represents a different estimation of equation 1. Columns 1-3 present the estimates of the discontinuity in Habsburg investments at the former empire border using various orders of polynomials in distance from the border as controls. Column 4 uses a local linear approximation with an optimal bandwidth of 85.59 kilometers. Country fixed effects and robust standard errors are used in every estimation. This analysis excludes Hungarian investors, the city of Belgrade, and 5 surrounding suburbs.

b) $p < 0.10^*$, $p < 0.05^{**}$, $p < 0.01^{***}$

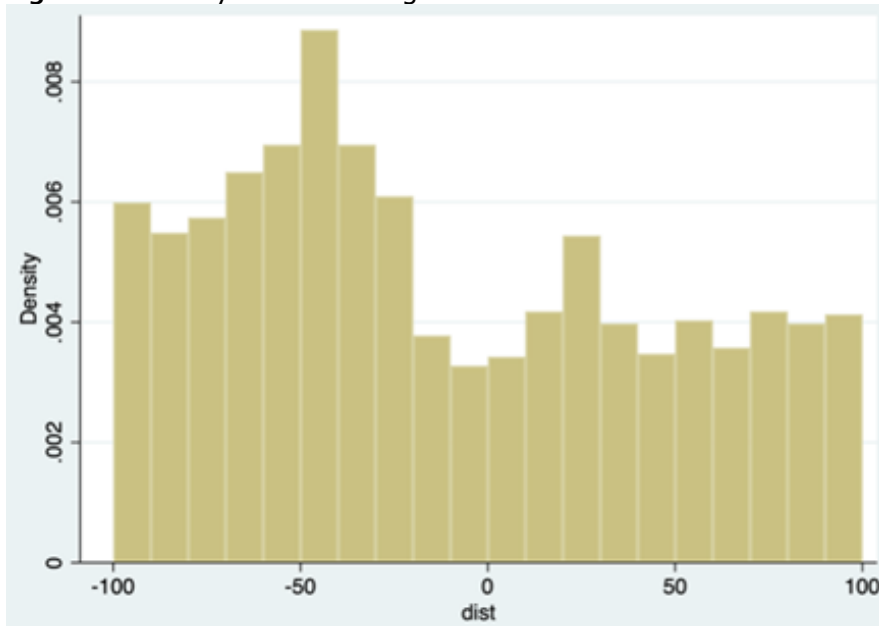
A2: Figures

Figure 7: Regional Characteristics of Serbia (District).



Note: These figures portray how regional and economic characteristics in Serbia vary across the former empire border. The vertical axis denotes the average value for a given variable, while the horizontal axis denotes the distance in kilometers from the border. Negative values represent the distance to the border from cities that were never in the former empire, while positive values represent the distance to the border from cities that were located in the former empire territory. Only Belgrade is excluded from this analysis.

Figure 8: Density of the Forcing Variable.



Note: This figure examines the density of the forcing variable, distance to the border in kilometers from cities in the analysis. This figure serves to establish that investors are not sorting into the former empire territory. To verify that this is the case, there should be no evidence of a discontinuity in the number of cities at the border. While there are more cities in the non-empire territory, this figure presents evidence that there is no discontinuity in the number of cities at the former empire border.

Impacts of Drought on Barge Traffic and Grain Exports from the U.S., 2022-2023

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Abstract

The U.S. is a major exporter of grains for the world market, much of which depart the New Orleans Port Region after first having traveled by barge down the Mississippi River from the country's Midwest breadbasket. The efficiencies related to this transport geography enable U.S. grain producers to compete with producers in South America who enjoy many cost and climate advantages. This paper examines the impacts of drought on the southbound flow of grains in 2022-2023, when the river levels reached dramatic lows, causing barge and grain storage capacities to greatly diminish. It provides a basic overview of the transport patterns of grains in the Midwest and Mid-South, from farms to barge ports, and discusses some of the alterations to normal arrangements of storage and shipping. The agriculture and commercial freight news media have highlighted the shipping and storage bottlenecks resulting from the droughts, and this paper summarizes those findings. However, this research finds that the wide array of possible transportation modes of the U.S., including barge, rail and trucking that criss-cross the country, as well as storage capabilities, have led to a surprising resiliency of grain supply chains, and a continued ability for the U.S. to compete in global grain markets.

Keywords: Grains; freight transportation; barge ports; Mississippi River Basin; drought; grain exports

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Hot Potato in Your Venmo

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Summary Note

With the development of technology and drastic changes in consumer lifestyle, digital payment modes such as Venmo, PayPal and Zelle have been widely used, and consumers nowadays are getting accustomed to making daily monetary transactions via these payment modes. Despite the burgeoning utilization of digital payment modes, research on the impact of payment modes on consumers' spending decisions and behaviors is comparably scarce (Raghubir, 2006; Raghubir & Srivastava, 2008). Would consumers' willingness to spend the money deviate from different payment modes? How would the feeling of money in digital payment account differ from traditional payment account? This research was determined to address these questions.

As abundant literature demonstrates that in the domain of money, normative principle of descriptive invariance, which indicates that preferences should not be different when the same objective stimuli are present differently, is commonly violated (Gourville, 1998; Raghubir & Srivastava, 2002, 2008; Shefrin & Thaler, 1988), relatively few studies have investigated how consumers' spending behavior vary between digital payment modes and traditional payment modes such as Cash and Checking. The few existent studies on digital payment mode only investigated how digital payment decreased the feelings of interpersonal closedness (Wilson, Santana, & Paharia, 2019), how digital payment reduced the salience of partying with money (Huang & Savary, 2018) and how increased attachment of digital payment modes weakened the pain of payment (Pisani & Atalay, 2018). While these studies contributed to understanding impact of utilization of digital payment modes, to our knowledge, no previous research has investigated the perceptions of money in digital payment modes and its downstream effect on consumer spending behavior. Specifically, will consumers feel the money in Venmo much safer or less safe compared to the money in Cash or Checking account? Will the perceptions of safety of money influence, to what extent, consumers are willing to spend the money?

Consumers feel the money in their Venmo to be unsafe.² Unsafety is associated with high risk, and risk aversion literature suggests that when making choices and consumption decisions, consumers intend to avoid the risk (Benartzi & Thaler, 1999; Rabin & Thaler, 2001). Given that storing the money in Venmo could elicit potential risk³, consumers should spend the money in Venmo as soon as possible to avoid the risk, in another word, consumers should get rid of the "hot potato" in their hand.

Our research contributes to the marketing field in three ways. First, we add to the literature of payment modes by showing that consumers are more likely to spend the money in Venmo than the money in Cash and Checking account. Second, we demonstrate a novel mechanism of consumer spending that consumers would be more likely to spend the money in Venmo because the lower perceptions of safety of money in Venmo compared to the money in Cash and Checking account. Third, our research provides practical implication that making consumers to initiate monetary transaction via digital payment modes would increase consumers' spending and thus offering promising benefits for retailers and companies. In the following sections, we present four studies to support our hypothesis.

The first study tested consumers' perceived safety of money in either Venmo, Cash and Checking account. Eighty participants from the mTurk online panel (52.50% female, $M_{age}=38.78$)

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² <https://www.marketplace.org/2018/02/20/what-are-apps-venmo-doing-your-money/>

³ <https://www.thebalance.com/venmo-scams-315823>

participated in the study. We employed a one factor (money value: \$10, \$100 and \$1,000) within subject repetitive measure design. Each participant was asked to report their perceived safety of money ("If I have \$10/\$100/\$1,000 in Venmo/Cash/Checking account, I would feel", 1 = "Unsafe", 7 = "Safe").

In \$10 level, results revealed significant differences of perceived safety of money between Venmo and Cash and between Venmo and Checking account ($M_{\text{venmo}} = 5.38$, $M_{\text{cash}} = 6.16$, $t(79) = -3.80$, $p < .001$; $M_{\text{venmo}} = 5.38$, $M_{\text{checking}} = 6.29$, $t(79) = -4.27$, $p < .001$), suggesting that when possessing small amount of money in Venmo, consumers perceived the money to be less safe than the money in both Cash and Checking account, and consumers showed indifferent perceived safety between money in Cash and money in Checking account ($t(79) = -1.00$, $p > .05$). In \$100 level, results revealed significant differences of perceived safety of money between Venmo and Cash, between Venmo and Checking account and between Cash and Checking account ($M_{\text{venmo}} = 4.91$, $M_{\text{cash}} = 5.89$, $t(79) = -4.13$, $p < .001$; $M_{\text{venmo}} = 4.91$, $M_{\text{checking}} = 6.33$, $t(79) = -6.13$, $p < .001$; $M_{\text{cash}} = 5.89$, $M_{\text{checking}} = 6.33$, $t(79) = -2.27$, $p = .03$). Such results suggested that with the increase of the face value of money, while consumers still perceived the money to be less safe in Venmo than in Cash and Checking account, money in Cash was also perceived as less safe than in Checking account. In \$1,000 level, results revealed significant differences of perceived safety of money between Venmo and Checking account and between Cash and Checking account ($M_{\text{venmo}} = 4.64$, $M_{\text{checking}} = 6.48$, $t(79) = -8.10$, $p < .001$; $M_{\text{cash}} = 4.81$, $M_{\text{checking}} = 6.48$, $t(79) = -6.54$, $p < .001$), but there was no difference between Venmo and Cash ($t(79) = -.58$, $p > .05$), indicating that in high face value level, both money in Venmo and money in Cash were perceived as less safe than money in Checking account, and consumers felt the money in Venmo and money in Cash as equal comparably unsafe. Once consumers feel the money to be less safe, consumers would be more likely to spend the money. The following three studies were designed to test this effect in multiple contexts.

Given the results from the first study, the second study was designed to test consumers' spending behavior of money between Venmo and Checking account. One hundred and thirty-one participants from the mTurk online panel (60.30% female, $M_{\text{age}} = 34.15$) participated in the study. We employed a 2 (payment account: Venmo vs. Checking) \times 2 (rent in total: two months vs. three months) between and within subject mixed design. Participants were asked to imagine they just got paid for a work that took 3 months to complete, and \$4,500 would be paid in their Venmo (vs. Checking) account. Then, each participant answered two items to indicate their likelihood to use the money to pay for two months and three months housing expenses ("I will use this money to pay for next 2 months' housing"; "I will use this money to pay for next 3 months' housing", 1 = "Extremely unlikely", 7 = "Extremely likely"). Independent t-test revealed no differences between Venmo condition and Checking condition in terms of likelihood to use paid money to pay two months housing ($M_{\text{venmo_two_months}} = 5.08$, $M_{\text{checking_two_months}} = 4.96$, $t(130) = .35$, $p > .05$) and three months housing ($M_{\text{venmo_three_months}} = 5.05$, $M_{\text{checking_three_months}} = 4.52$, $t(130) = 1.41$, $p > .05$). However, within Venmo condition, paired sample t-test showed no difference between likelihood to use paid money to pay two months housing and three months housing ($M_{\text{venmo_two_months}} = 5.08$, $M_{\text{venmo_three_months}} = 5.05$, $t(61) = 0.28$, $p > .05$), suggesting that consumers felt the money in Venmo account was less safe and therefore they were more likely to use the money as much as possible. On the contrary, within Checking condition, paired sample t-test showed a significant difference between likelihood to use paid money to pay two months housing and three months housing ($M_{\text{checking_two_months}} = 4.96$, $M_{\text{checking_three_months}} = 4.52$, $t(68) = 2.85$, $p < .01$), suggesting that consumers felt the money in Checking account was much safer and thus they were less likely to spend the money in Checking account.

The third study was designed to test consumers' spending behavior of money between Venmo and Cash in a consecutive decision-making scenario. If consumers feel the money in Venmo account less safe, they should be more likely to continue to spend the money in Venmo account. If consumers feel the money in Cash much safer, they should be more likely to switch to spend the money in Venmo account. One hundred and thirteen students from an eastern coast university (68.14% female, $M_{\text{age}} = 20.45$) participated in this study. Each participant was asked to imagine that they had \$100 in cash and \$100 in Venmo, and each participant was asked to make a decision on whether they would like to use the money in Venmo or Cash to spend in two consecutive scenarios. The first scenario asked participants to purchase a textbook that cost \$60, and the

second question asked participants to give \$30 to a friend for an outing experience they were splitting. For the first scenario, 54 participants chose to use the money in Venmo, and 59 participants chose to use the money in Cash. For the second scenario, 43 participants from who chose to use money in Venmo in the first scenario continued to use the money in Venmo while 46 participants from who chose to use money in Cash in the first scenario switched to use the money in Venmo. A chi-square test revealed a significant difference of decisions in the second question ($\chi^2(1, 112) = 37.41, p < .001$), suggesting that consumers who initially chose to use money in Cash for spending had a higher intention to switch to use money in Venmo and consumers who initially chose to use money in Venmo for spending had a higher intention to continue to use money in Venmo. Results from the third study indicated that consumers felt the money in Venmo was less safe than money in Cash and thus they were more willing to spend the money in Venmo.

The last study was designed to test consumers' spending behavior of money between Venmo and Checking account in a different context. Debit card was usually associated with consumers' checking account and was commonly used in online purchasing context, so we used money in Debit card to represent money in Checking account. One hundred and seventy-one participants from the mTurk online panel (63.74% female, $M_{age}=35.70$) participated in the study. We employed a one factor (payment account: Debit card, Venmo large and Venmo small) between subjects design. All participants were asked to imagine they were online shopping for holiday gifts and were presented with an advertisement of a robot vacuum selling as \$264.99. They were then directed to a checkout process. On the following checkout page, participants in Debit card condition saw that they would pay \$264.99 with Debit card on file and participants in Venmo large (vs. small) condition saw that they would pay \$253.84 (vs. \$ 33.84) in Venmo balance and use Debit card to pay the rest \$11.15 (vs. 231.15). Participants then reported their likelihood to place the order ("How likely will you place the order for this robot vacuum?", 1 = "Extremely unlikely", 7 = "Extremely likely"). One-way ANOVA revealed a significant difference among three payment accounts on likelihood to place order ($F(2, 169) = 8.93, p < .001$). Participants from Venmo large condition were more likely to place the order than participants in Debit card condition ($F(1, 169) = 8.35, p < .001$) and participants in Venmo small condition ($F(1, 169) = 16.97, p < .001$), suggesting that when considering about spending money from both Venmo and Debit card at the same time, larger portion of money stored in Venmo would make consumers' feel the money to be less safe than small portion of money stored in Venmo, resulting in a higher likelihood to spend the money in Venmo. Again, our results corroborated that consumers felt the money in Venmo was less safe than money in debit card and hence consumer were more likely to use the money in Venmo to place the order than the money in Debit card.

In summary, we show that consumers' spending behaviors vary across different payment modes because of the different perceptions of safety of money. Specifically, consumers hold lower perceptions of safety of money in Venmo compared to money in Cash and Checking account, and therefore consumers are more likely to spend the money in Venmo than the money in Cash and Checking account. Our findings contribute to the literature by filling the gap between consumers' perceptions of money in digital payment modes and consumers' spending behavior.

Table 1: Results.

		Venmo			Cash			Checking (Debit)		
		\$10	\$100	\$1000	\$10	\$100	\$1000	\$10	\$100	\$1000
S1	Safe	5.38 (1.82)	4.91 (1.83)	4.64 (1.92)	6.16 (1.47)	5.89 (1.42)	4.81 (2.06)	6.29 (1.33)	6.33 (1.26)	6.48 (1.04)
S2	WTP	2-Month		3-Month		2-Month		3-Month		
		5.08 (2.14)		5.05 (2.15)		4.96 (1.94)		4.52 (2.13)		
S3	Switch Continue	11 (20.37%) 43 (79.63%)			46 (77.97%) 13 (22.03%)					
S4	Purchase Intention	Large		Small				4.91 (1.58)		
		5.70 (1.38)		4.46 (1.86)						

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La importancia de las habilidades del lenguaje para la comunicación y el aprendizaje en la educación superior

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Resumen

La comunicación y el aprendizaje son procesos que requieren del desarrollo de habilidades cognitivas y sociales que permitan la comprensión y la interpretación de información y del comportamiento humano. Algunas de las habilidades del lenguaje como la lectura y escritura permiten además de ampliar el vocabulario, mejorar la manera de interactuar con los demás, así como también ampliar formas de comprensión y de transferencia de la información. En este trabajo se aborda la importancia de estas habilidades en los estudiantes universitarios. Se realizó una revisión de literatura de artículos indexados en Scopus. Se encontró que desde el proceso de formación en la universidad la participación en actividades relacionadas a la investigación como la consulta de información en bases de datos científicas y la redacción o llevar un diario pueden estimular las habilidades de lectura y escritura en los estudiantes universitarios.

Palabras clave: Comunicación; escritura; educación; lectura; neurociencia

The Importance of Language Skills for Communication and Learning in Higher Education

Communication and learning are processes that require the development of cognitive and social skills that allow the understanding and interpretation of information and human behavior. Some of the language skills such as reading and writing allow, in addition to expanding vocabulary, improving the way of interacting with others, as well as expanding ways of understanding and transferring information. This work addresses the importance of these skills in university students. A literature review of articles indexed in Scopus was carried out. It was found that from the training process at the university, participation in activities related to research such as consulting information in scientific databases and writing or keeping a diary can stimulate reading and writing skills in university students.

Keywords: Communication; writing; education; reading; neuroscience

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Estudio exploratorio descriptivo de una pedagogía de innovación para desarrollar la mentalidad de crecimiento en la enseñanza superior

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Resumen

Una manera tradicional de evaluar a un estudiante consiste en verificar la respuesta al proceso de enseñanza aprendizaje, los profesores suelen sentirse expectantes o ansiosos, sin embargo, el comportamiento y el tipo de mentalidad son factores que pueden influir en el resultado de la evaluación. Dweck (2008) establece que una pequeña intervención puede producir un gran impacto, al examinar las creencias de la persona y su personalidad pueden ser modificables. Este estudio trata de identificar el tipo de mentalidad fija o aprendiente de los estudiantes universitarios. En el contexto de análisis se tomaron tres grupos del mismo grado escolar, asignatura y proceso estandarizado de enseñanza. Se aplicó un cuestionario con escala de medición de mentalidad fija y aprendiente, los resultados demuestran diferencias en el tipo de mentalidad, que se podría ser un punto de partida para diseñar estrategias pedagógicas, para desarrollar una mentalidad de crecimiento en concordancia con su contexto.

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MathParty: Transformando el aprendizaje de las matemáticas a través de la gamificación

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Resumen

La gamificación, entendida como la aplicación de elementos y dinámicas propias de los juegos en contextos no lúdicos, ha emergido como una poderosa herramienta en el ámbito educativo y empresarial. Su importancia radica en la capacidad que tiene para aumentar la motivación, el compromiso y la participación de los individuos en tareas y actividades que de otro modo podrían percibirse como aburridas o desafiantes. La gamificación impulsa el involucramiento por parte de los participantes y también puede mejorar la retención de información, el desarrollo de habilidades y el logro de objetivos concretos.

En este trabajo se presenta el proyecto MathParty, un software que nació en respuesta a la percepción negativa y la falta de interés hacia las matemáticas entre los estudiantes de primaria y secundaria. MathParty tiene como objetivo transformar la experiencia de aprendizaje de las matemáticas en una actividad interactiva y emocionante, aprovechando la mecánica de la competencia en videojuegos para motivar a los jóvenes a practicar y mejorar sus habilidades matemáticas.

MathParty es una plataforma de minijuegos matemáticos diseñados para abarcar una amplia gama de niveles de dificultad, desde primero de primaria hasta tercero de secundaria. En su diseño se destacan elementos como un sistema de puntuación, la diversidad de minijuegos y la promoción de una competencia amistosa entre los jugadores. Este software educativo fue desarrollado en el lenguaje C# y puede ejecutarse en plataforma Windows. Sus requerimientos técnicos mínimos son Procesador Intel Core i3-4300k, Intel processor Graphics HD 400, 4GB de Memoria RAM y 80MB de almacenamiento.

El proyecto se encuentra en una etapa temprana de desarrollo. Sin embargo, algunos de sus avances ya se han mostrado públicamente y las personas han podido interactuar con él. Las evaluaciones preliminares han revelado que el software genera gran interés entre niños, adolescentes y adultos. Asimismo, se ha observado que MathParty es una herramienta que puede promover el aprendizaje activo y motivado de las matemáticas entre los estudiantes de primaria y secundaria, principalmente.

Se recomienda continuar con el desarrollo y la evaluación de MathParty. Es necesario incorporar las retroalimentaciones recibidas por los usuarios y trabajar en la adaptación de la plataforma a los requerimientos y preferencias del público objetivo. Además, es necesario realizar pruebas piloto, en donde MathParty se incorpore formalmente como parte de las asignaturas de matemáticas de primaria y secundaria.

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Diseño de ambientes de aprendizaje emprendedor en la modalidad de blended learning

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Resumen

En el siguiente proyecto proponemos la utilización de los “Wikis” que, en pocas palabras, es un sitio web que permite que los usuarios de la misma añadan contenidos, los editen y formen interesantes sitios con diversos contenidos. Pueden crear glosarios, armar trabajos prácticos, organizar temas, crear una enciclopedia, libros de texto e incluso realizar apuntes. Dirigido a alumnos de nivel licenciatura, la epistemología en que se basará es la del subjetivismo, ya que el aprendizaje va a estar sujeto a la experiencia que desarrollen los estudiantes mediante la actividad de aprendizaje. Además de que se tomará el constructivismo para que cada estudiante desarrolle su aprendizaje a través de sus propias experiencias.

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La mercadotecnia experiencial en los negocios: Un análisis de las estrategias aplicadas y sus características en lo presencial y digital

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Resumen

En una revisión analítica de la literatura, se explorará la economía de la experiencia, que sirve de fundamento para la mercadotecnia experiencial. Se examinarán las definiciones de diversos autores, así como las características inherentes a esta perspectiva y su aplicación en el entorno empresarial. También se destacarán las diferencias fundamentales entre la aplicación de estrategias de mercadotecnia tradicional y las estrategias de mercadotecnia digital, así como su aceptación por parte de los consumidores.

Palabras Clave: Mercadotecnia, Mercadotecnia experiencial, Mercadotecnia digital.

Experiential Marketing in Business: An Analysis of the Strategies Applied and Their Characteristics in Person and Digital

Abstract

In an analytical review of the literature, the experience economy, which serves as the foundation for experiential marketing, will be explored. The definitions of various authors will be examined, as well as the characteristics inherent to this perspective and its application in the business environment. The fundamental differences between the application of traditional marketing strategies and digital marketing strategies, as well as their acceptance by consumers, will also be highlighted.

Keywords: Marketing, Experiential Marketing, Digital Marketing.

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Introducción

Podemos reflexionar sobre las razones que impulsan las nuevas tendencias del marketing en la actualidad. El mundo experimenta una creciente globalización, con la tecnología en constante evolución y fácil acceso, mientras que la información se vuelve cada vez más abundante y accesible tanto para individuos como empresas.

En el contexto global actual, se otorga una gran importancia a la experiencia del consumidor y su influencia en la satisfacción. Las experiencias se consideran valiosas y se aprovechan para brindar un mayor valor al cliente. Estas experiencias se originan a partir de diversas circunstancias y situaciones en las que los individuos observan, viven y presencian eventos que enriquecen su conocimiento. Como resultado, los consumidores pueden experimentar tanto satisfacción como insatisfacción al intentar satisfacer sus necesidades a través de la adquisición o uso de productos o servicios.

El aumento de la competencia y los cambios en los patrones de compra de los consumidores han destacado la necesidad de adoptar un enfoque de marketing más acorde con la realidad actual del mercado. En consecuencia, el concepto de marketing ha evolucionado con el tiempo, pasando de centrarse en la simple transacción o venta a orientarse hacia el establecimiento de relaciones sólidas y duraderas con los clientes.

Contexto teórico

López-Rúa (2015) menciona la finalidad principal y primordial del marketing es que se pueda lograr un compromiso emocional con el consumidor para que recuerde la marca, y para permanecer en su memoria se debe tocar la fibra de sus sentimientos; por eso hay que crear una historia con la cual pueda identificarse y comprometerse y que el objetivo es que el consumidor se comporte de acuerdo con sus impulsos y emociones, más que a su razón.

En el mismo artículo relata el estudio de neuromarketing que Lindstrom realizó, que fue el más costoso del mundo, se hizo un escáner mental a 2,081 consumidores de 5 países diferentes, fueron sometidos a estímulos publicitarios visuales, olfativos y auditivos, mientras se controlaba su actividad cerebral, dilatación de la pupila, actividad sudorípara y movimientos faciales. El 83% de la publicidad existente capta sólo uno de los sentidos: la vista, lo cual para el autor es un error, ya que se debe apuntar a todos los sentidos.

Holbrook y Hirschman (1982) llevaron a cabo un análisis con el cual contrastaron dos puntos de vista acerca del comportamiento del individuo:

1. Orientado hacia la elección racional con base en el modelo de procesamiento de la información.
2. Desde una visión experiencial, donde se consideran como aspectos influyentes en la toma de decisión las actividades lúdicas, los placeres sensoriales, las fantasías, el disfrute estético y las respuestas emocionales.

Torres y Mora (2017) hacen una aproximación conceptual a las definiciones de satisfacción y experiencias de consumo, articulando las mismas alrededor de la gestión de las experiencias como vía para la consolidación de mejores y más profundas relaciones con el consumidor, a través de la satisfacción de necesidades por medio de la integración de diferentes elementos que hacen del consumo un componente más dentro de todo un proceso de planificación de momentos, situaciones, circunstancias que generan en el consumidor vínculos de carácter emocional y simbólicos.

Pine y Gilmore (1998) escriben la Experience Economy y esto se convirtió en una primera referencia teórica, en donde resalta que la experiencia es el resultado entre un sujeto o varios y una actividad o evento, puede ser físico, intelectual, emocional o espiritual, haciendo hincapié de la experiencia como carácter único y personal lo que otorga un mayor nivel de relevancia frente a otros elementos.

Schmitt (1999) propone un enfoque de marketing experiencial con base en los diversos tipos de experiencia, denominados por él como módulos experienciales estratégicos.

La American Marketing Association define el marketing experiencial como el proceso de creación, comunicación y entrega de valor a los clientes, y agrega que otros la definen como la ciencia y el arte de gestionar las emociones asociadas a las interacciones con las compañías. (20/mar/2018).

Existen desafíos y debemos enfrentar aquellos que investigamos y se dedican en la vida profesional al marketing. Estos retos que datan del año 1994 de acuerdo con Carbone y Haeckel, son las dificultades de diferenciación de productos y servicios, el reconocimiento de la importancia de las experiencias de los clientes de Allen, Reichheld y Hamilton (2005) y la necesidad de lograr una ventaja competitiva de Gentile, Spiller y Noci (2007).

Tabla 1: Comparativa sobre el marketing experiencial.

Schmitt (1999) Tipos de experiencias.	Rieunier (2000) Componentes de la atmósfera.	Thaignée Pereda (2019) Reúne diversas vertientes.
Sensoriales (sensaciones) Que buscan proporcionar placer estético, emoción, satisfacción y belleza a través de la estimulación de los cinco sentidos.	Factores visuales: Colores, materiales, luces, diseño (espacio, limpieza). Factores sonoros: Música, ruidos. Factores olfativos: Los olores naturales, los olores artificiales. Factores táctiles: Materiales, temperatura. Factores gustativos: Textura, sabor, temperatura.	Sentidos Marketing Sensorial Estimular sus sentidos (vista, gusto, tacto, oído y olfato) y apelar a sus instintos básicos. Otras ideas del común, es el crear algo excitante por medio de películas, aromas, sonidos, sabores y sensaciones táctiles.
Afectivos (sentimientos) Que procuran generar afecto hacia la empresa y la marca a través de proveedores de experiencia.	Otras ideas del común, como los sueños, amor y nostalgia.	Emociones Marketing Emocional Los sentimientos y experiencias positivas relacionadas con un producto o servicio tienen un gran impacto en la decisión de compra.
Cognitivos (pensamientos) Que incentivan a los clientes a participar en un proceso creativo que promueva la reevaluación de la empresa y de los productos.		Pensamientos Marketing Creativo La percepción de un producto puede verse positivamente influenciada por el uso de la creatividad. (soluciones con cierto grado de innovación y funcionalidad).
Físicos (actuaciones) Que estimulan la creación de experiencias relacionadas con el cuerpo, patrones de comportamiento y estilos de vida a largo plazo.		Estilo de vida Marketing Vivencial En un mundo donde solo el cambio es constante, es mandatorio analizar y comprender el comportamiento de tu target.
De identidad social (relaciones) Que invitan al individuo a relacionarse con el contexto social y cultural reflejado en la marca.		Relaciones Marketing Relacional Los seres humanos somos sociales por naturaleza, por esta razón, uno de los aspectos fundamentales para una excelente experiencia de compra es la interacción.

Nota: Elaboración propia según autores revisado.

Que se pide el cliente hoy:

- Necesidad de algo diferente.
- No sólo existen tiendas físicas, coexiste también lo virtual.
- Las marcas de calidad también requieren de dar más al cliente.

De acuerdo con Rieunier (2002), el enfoque del marketing sensorial trata de llenar las deficiencias del «marketing tradicional», que es demasiado racional.

El marketing sensorial hace foco en las experiencias vividas por los consumidores y sus sentimientos en el proceso. Estas experiencias tienen sensaciones, emociones, conductas cognitivas, y dimensiones relacionales, no sólo funcionales. El objetivo es que el consumidor se comporte de acuerdo con sus impulsos y emociones, más que a su razón.

Principios para una estrategia de marketing de la experiencia

Los siguientes principios desarrollados a continuación, están realizados en base al trabajo de DeVine y Gilson (2010):

Principio 1 Final fuerte.

El primer principio que se debe considerar tiene que ver con la importancia de un final fuerte, que tenga un alto impacto. Esto lleva a comenzar con eliminar el preconceito de que importa tanto el inicio como el final de la experiencia. Las personas, prefieren un gran final, ya que eso es lo que permite generar el concepto de que la experiencia sea memorable en el tiempo, y es lo último que se lleva el cliente.

Principio 2 Eliminar o reducir la mala experiencia lo antes posible.

En un servicio donde existe la posibilidad de tener tanto buenas como malas experiencias, las personas prefieren tener las malas al principio, y recibir las buenas al final de una secuencia, para quedarse con ellas de una forma memorable.

Principio 3 Segmentar el placer combinado con la situación de incomodidad.

Las personas tienen una reacción asimétrica a las pérdidas y ganancias.

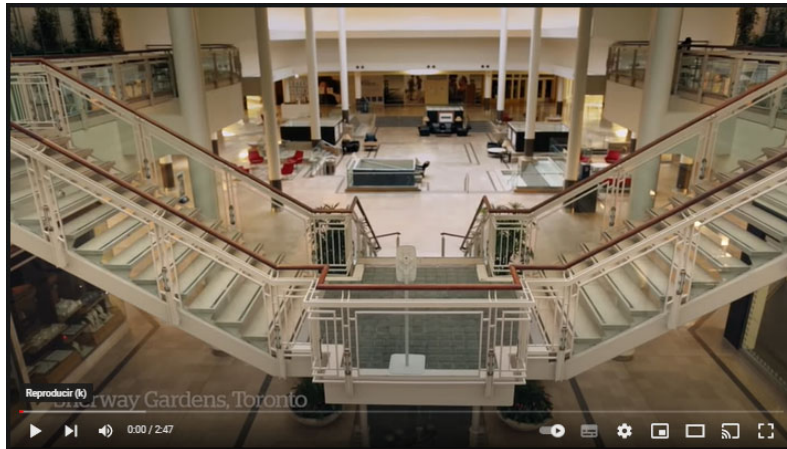
Principio 4 Construir compromiso a través de la elección.

Las personas son más felices y se sienten mejor si creen que tienen algún tipo de control sobre un proceso, particularmente si no es cómodo.

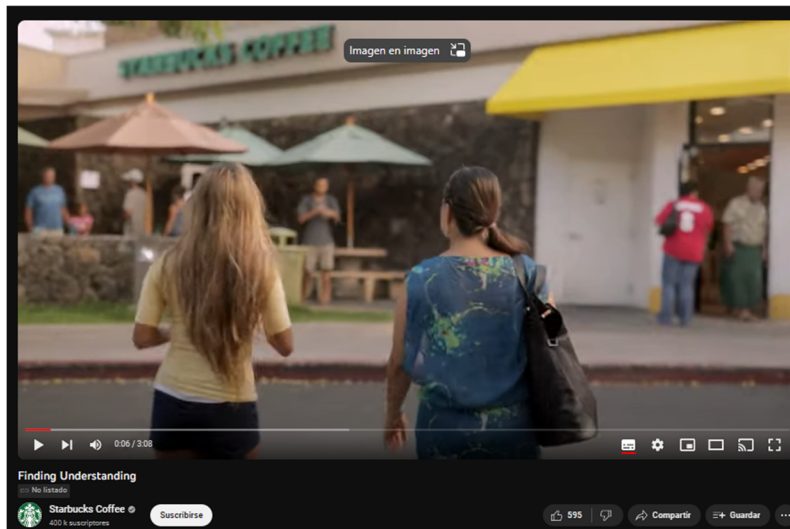
Principio 5 Dar y mantener rituales a los clientes.

Esto también los hace sentir cómodos.

Ejemplos de una campaña de Marketing Experiencial: Mattel y Starbucks



Fuente de vídeo: <https://youtu.be/M8Ro3bZ3WoM?si=zXoWK5gHN-qOei6M>



Fuente de vídeo: <https://youtu.be/mYdpsbfW-Fw?si=dkYn-giNN158-oDS>

En estos dos vídeos, se trabaja con el marketing experiencial, en el primero la empresa Mattel coloca una pantalla en un Mall, en donde la gente pensaba que sólo era publicidad, pero era una pantalla interactiva, y a través de inteligencia artificial al pararse al frente de ella empezabas a jugar Pictionary con esa pantalla y respondía de manera muy natural con lo cual las personas que jugaban mostraban emociones al instante al estar interactuando con el juego por medio de una máquina a través de una pantalla con imagen de una personal real, lo cual genera un gran impacto en las personas.

En el segundo vídeo que es de Starbucks, se ubican en una población en Brasil, en donde la ubicación de este establecimiento tiene un espacio para personas con una deficiencia auditiva y ahí pueden encontrar un lugar en donde ellos se sienten acogidos y seguros en sus relaciones con personas de su misma situación y con los demás que entiendan el lenguaje por signos, haciendo alusión como una empresa preocupada por la inclusión y lo que la hace sentir sensible a todas las personas sin discriminación y que tienen un espacio para todos.

Con estos dos ejemplos podemos darnos cuenta de la mercadotecnia experiencial puede lograr en los individuos la importancia de las emociones y sensaciones que los individuos experimentan no sólo al comprar un producto o servicio, sino el sentirse tratados como personas que tienen sentimientos, emociones y necesidades que van más allá del hecho de un simple proceso de comprar algo.

Los principales elementos para considerar al elaborar una experiencia clave

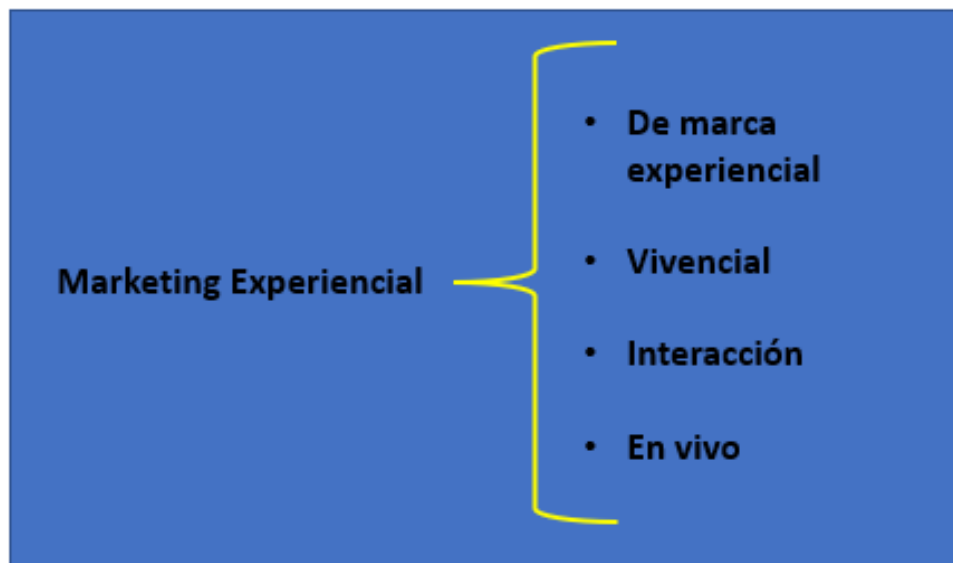
- Servicio Memorable.
- La Experiencia trabaja sobre Pensamientos, Relaciones, Actuaciones, Sensaciones y Sentimientos.
- Cuanto más integral es el modelo mejor funciona. Si bien es importante tener en cuenta las claves para una experiencia, es fundamental, considerar cuales son los pasos a seguir para la elaboración de una experiencia que sea integradora.

Pasos para seguir:

1. Analizar el Modelo de Negocio.
2. Determinar el Tema de la Experiencia.
3. Analizar cada variable de la Experiencia (Pro/Contras).
4. Determinar las variables a profundizar.
5. Analizar la sostenibilidad y dinámica del modelo.

De lo tradicional a lo digital

De un artículo de Amazon-ads del 2 de abril de 2021 integramos la siguiente figura del marketing experiencial:



Fuente: Elaboración propia.

Marketing Experiencial

Permite a las marcas conectar con los consumidores mediante experiencias. Aunque estas experiencias suelen ser presenciales, a menudo incluyen componentes digitales, y el

conjunto completo está diseñado para dar vida a una marca de una manera grande y significativa.

En la revista lemon-digital, uno de sus artículos llamado Marketing experiencial: “Qué es, características y cómo aplicarlos en una estrategia” escrito por Thaignée Pereda en mayo 30 de 2019 nos menciona que la era digital se sigue retando al marketing tradicional a esta era tan vertiginosa y que también implica un cambio en el comportamiento de sus consumidores.

Que el marketing experiencial brinda un enfoque que invita a las marcas y empresas a alejarse un poco de la promoción invasiva de sus productos y a reorientar sus esfuerzos hacia un agente vital para el éxito de su negocio: sus clientes.

Experiencias de Marketing

Desde tiendas fugaces hasta eventos móviles, pasando por fiestas o instalaciones interactivas. Pueden ser eventos íntimos o colaboraciones con celebridades o influencers. No hay límite, siempre y cuando la experiencia tenga sentido para la marca, respalde sus objetivos de marketing y aporte novedad y satisfacción a los clientes. (Amazonads)

La misma Thaignée Pereda dice que las principales ventajas del internet, para grandes marcas, emprendedores y profesionales de marketing digital; es que el mundo virtual ofrece múltiples herramientas y oportunidades que anteriormente no existían o ameritaban más tiempo y esfuerzo. Y refuerza su concepto así:

El Marketing Experiencial o Marketing de Experiencias es una estrategia enfocada a la creación de un vínculo significativo con los clientes a través de vivencias positivas sobre el producto o la marca.

Elementos de las mejores campañas de marketing experiencial (Amazonads)

- La marca está bien representada. Está claro quién organiza la experiencia, y la campaña es relevante y se mantiene centrada en la marca.
- La experiencia es memorable e interactúa con los clientes de formas inesperadas más allá de los anuncios estándar.
- La experiencia se puede medir. Especialmente en las experiencias presenciales, las campañas de marketing experiencial pueden ser difíciles de medir. Algunas maneras de hacerlo son contando el número de asistentes, haciendo encuestas después del evento o usando hashtags y páginas de destino en las redes sociales para la experiencia específica. Las experiencias en línea son más fáciles de rastrear gracias a la ratio de clics (CTR), las vistas y otras métricas.

Como aplicarlo de acuerdo con Thaignée Pereda

Los escenarios y realidades son un poco diferentes entre sí por lo que algunas estrategias que pueden ser muy efectivas en un negocio presencial deben adaptarse al entorno digital y a la manera en que los clientes interactúan con tu marca, pues allí está la clave para proyectarte como la mejor opción y ofrecerles una experiencia única y memorable.

Técnicas y recursos recomendados para el marketing online que pueden mejorar la experiencia del cliente o usuario:

- Diseño
- Storytelling
- Infografías y vídeos
- Redes sociales

Para Moser (2012) Concluye en entender la importancia de la utilización de estrategias de marketing experiencial como una herramienta de diferenciación que logra crear valor para los consumidores. Demuestra que el marketing tradicional dejó de ser una herramienta que les permite a las organizaciones competir de manera efectiva: se debe dejar de lado el exceso en el foco en las características funcionales y los beneficios de los productos, el foco el marketing mix y la segmentación excesiva, para evolucionar hacia estrategias que se adecuen a las verdaderas necesidades de los consumidores.

López-Rúa (2015) enfatiza que el marketing experiencial – sensorial, comparado con el tradicional es por lo mucho más efectivo, involucrar las emociones, experiencias y sensaciones del consumidor logrará que tome ese compromiso, se involucre y por consecuencia la fidelidad con la marca.

Reflexiones finales

En el actual panorama de participación empresarial, que se caracteriza por su dinamismo, saturación y feroz competencia, las organizaciones se ven prácticamente forzadas a hacer la transición de sus modelos de negocio convencionales hacia los digitales.

Sin embargo, este cambio hacia lo digital conlleva la necesidad de ofrecer al mercado no solo un producto, servicio o idea, sino una experiencia positiva para sus consumidores o usuarios. Esto nos conduce a reconocer que estamos inmersos en una economía centrada en la experiencia.

La implicación de las organizaciones a través de sus estrategias de marketing debe estar intrínsecamente ligada a la creación de experiencias positivas para poder construir la auténtica lealtad de los consumidores. Los clientes, al igual que cualquiera de nosotros, seguimos a las marcas debido a las experiencias positivas que nos brindan en el proceso de selección de compra.

Además, es importante tener en cuenta que el marketing experiencial es el cimiento de la mercadotecnia relacional. Por lo tanto, resulta fundamental la idea de generar en el cliente experiencias únicas y valiosas.

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Fuente de vídeo 1: <https://youtu.be/M8Ro3bZ3WoM?si=zXoWK5gHN-qOei6M>

Fuente de vídeo 2: <https://youtu.be/mYdpsbfW-Fw?si=dkYn-giNN158-oDS>

Áreas dinámicas y redes de colaboración para el aprovechamiento sustentable de los recursos naturales en las áreas naturales protegida de Tamaulipas

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Resumen

Es notable la marcada disparidad de género en lo que respecta a la gestión y aprovechamiento de los recursos ambientales en áreas rurales. Las mujeres suelen estar subrepresentadas en la toma de decisiones, la resolución de problemas y las actividades económicas, especialmente en sectores como la silvicultura. Además, son ellas las que a menudo enfrentan las consecuencias más directas de la escasez o cambios en los suministros alimenticios y económicos, lo que las hace más vulnerables durante crisis como la climática.

En este contexto, la participación de las mujeres en iniciativas de conservación, particularmente a través de la innovación en la alimentación, no solo promueve la preservación del medio ambiente, sino que también les proporciona una oportunidad para alcanzar independencia y fortalecer su resiliencia socioeconómica mediante la participación en la gobernanza.

Mediante el uso de la cartografía participativa, se ha podido identificar las características socioculturales y socioeconómicas clave relacionadas con el uso y aprovechamiento de los recursos naturales en las comunidades rurales de Tamaulipas. Un grupo de mujeres residentes en áreas naturales protegidas fueron invitadas a marcar en un mapa con iconos predefinidos los lugares de avistamiento de mariposas monarca, sitios culturales y turísticos, cambios en el paisaje asociados al cambio climático, fuentes de recursos vitales como el agua y recursos económicos como plantas medicinales o alimentos, así como lugares de encuentro comunitario y participación en la resolución de problemas locales.

Se identificaron un total de 26 sitios, resaltando la escasa participación de las mujeres en la solución de problemas, especialmente en lo que respecta a la administración y distribución del agua. Además, se pudo trazar una red de distribución entre las comunidades para el comercio de plantas y animales. Las principales localidades involucradas en la cosecha y distribución comercial de estos recursos fueron San Vicente, San José y El Naranjo. Desde estas comunidades, los recursos se distribuyen hacia Ejido Llano de Azuas y los municipios de Palmillas, Ciudad Victoria y Jaumave, e incluso hacia San Luis Potosí. También se observó que algunos agricultores de San José y San Vicente, debido a la escasez de agua y al aumento de la temperatura, se ven obligados a viajar a otros municipios para comprar y comercializar productos que antes podían elaborar en sus propias tierras.

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Unidades económicas sociales para la producción regional (ALPR)

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Resumen

En los últimos años se ha retomado la relevancia de las Asociaciones Locales de Productores Regionales (ALPR) por el desabasto de alimentos, las diferentes instancias buscan reactivar a este tipo de organizaciones, con el fin que puedan ofertar en el mercado el suministro de productos clave para el consumo alimentario. Lo anterior no solo beneficia al suministro de alimentos, también beneficiará al crecimiento y desarrollo de las unidades económicas de la región.

Las ALPR pertenecen al sistema de producción regional, que son agrupaciones de productores promovidas por alguna dependencia u organismo de los gobiernos municipal, estatal o federal que, amparadas en la constitución mexicana, reciben garantías, cobertura gubernamental y se insertan en estrategias, programas y planes para el fomento del campo, pueden unirse por un emprendimiento social o privado.

Por otro lado, la Organización de Naciones Unidas para la Agricultura y Alimentación (FAO), conceptualiza a los sistemas productivos agrícolas en un contexto más empresarial como conjuntos de explotaciones agrícolas individuales con recursos básicos, pautas mercantiles, medios familiares de sustento y limitaciones en general que pretenden ampliar el medio familiar como principal entorno de producción agrícola, lo que viene a incentivar el sustento de la producción con la optimización de los recursos a manera de conseguir producción eficiente

La presente investigación se está generando con el fin de elaborar un modelo de competitividad a futuro para que este tipo de unidades económicas logren apoyar parte de la oferta alimentaria, pero además favorezca al crecimiento de las mismas empresas para el beneficio de la región donde se encuentran establecidas.

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Determinantes del consumo de frutas, verduras y tubérculos de los hogares de Coahuila, México

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Resumen

El objetivo de esta investigación es estimar el consumo de frutas, verduras y tubérculos de los hogares de Coahuila, México, así como determinar su relación con el ingreso y las características sociodemográficas. Para ello se propone la estimación de estadísticos descriptivos y modelos econométricos Tobit, con base en los microdatos de la Encuesta Nacional de Ingreso y Gasto de los Hogares (ENIGH) para el año 2022. Los resultados indican que el consumo medio de frutas y verduras tiende a aumentar a medida que los hogares se ubican en un estrato de ingreso más alto; mientras que el consumo medio de tubérculos se mantiene constante en todos los estratos de ingreso. Asimismo, las estimaciones del modelo Tobit muestran que el consumo de frutas, verduras y tubérculos tienen una relación positiva y estadísticamente significativa con la edad y el nivel educativo del jefe de hogar, lo mismo sucede con la presencia de niños y de adultos mayores de 65 años de edad en el hogar. De igual manera, se identificó que un incremento en el ingreso del hogar aumenta el consumo de los tres grupos alimentarios, aunque se comportan como bienes básicos, cuya elasticidad ingreso es menor a la unidad. En contraparte, se determinó que el contexto geográfico es relevante, ya que un hogar ubicado en una zona urbana tiende a reducir el consumo de frutas, verduras y tubérculos.

Palabras clave: Frutas; verduras; tubérculos; consumo alimentario; México

Determinants of Fruits, Vegetables, and Tubers Consumption in Households of Coahuila, Mexico

Abstract

The objective of this paper is to estimate the fruits, vegetables and tubers consumption in households of Coahuila, Mexico, as well as to determine its relationship with income and sociodemographic characteristics. To do this, the estimation of descriptive statistics and Tobit econometric models were proposed, based on the microdata of the National Survey of Mexican Household Income and Expenditures for the year 2022. The results indicate that average consumption of fruits and vegetables increases in high-income households, while tubers consumption remains constant in all income strata. Likewise, the Tobit model estimates show that consumption of fruits, vegetables and tubers has a positive and statistically significant relationship with the age and level of education of household's head, the same happens with the presence of children and adults over 65 years old. Similarly, it was identified that an increase in household income increases the consumption of the three food groups, although they behave like basic goods, whose income elasticity is less than unity. In contrast, it was determined that

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geographical context is relevant, since a household located in an urban area tends to reduce the consumption of fruits, vegetables, and tubers.

Keywords: Fruits; vegetables; tubers; food consumption; Mexico

Employing WarpPLS in a Doctoral Course on Structural Equation Modeling: First Student Presentation

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Abstract

This presentation will discuss the first of two student projects conducted as part of a course on international business and information systems research. The project employed the software WarpPLS to test a model with several hypothesized relationships among variables. The student team independently collected data to test their model, which addressed a topic on the intersection of international business and information systems research. Theoretical reviews and analyses or previously published empirical studies informed the development of the model with hypothesized relationships. Additional tests were conducted to ensure confidence on the results of the analyses, including multicollinearity tests.

Keywords: WarpPLS, Multiple Regression, Partial Least Squares, Structural Equation Modeling, Multicollinearity

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Employing WarpPLS in a Doctoral Course on Structural Equation Modeling: Second Student Presentation

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Abstract

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Using PLSF-SEM in International Business Research

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Abstract

Structural equation modeling (SEM) is a data analysis method that is widely used in international business, as well as research in many other fields, when scholars need to test complex models with multiple direct and indirect hypothesized relationships. To date, however, researchers have had to choose between employing covariance-based SEM, and dealing with convergence problems for models with complexity levels going beyond nontrivial theory-testing; or composite-based SEM, and facing serious methodological challenges due to this technique's propensity to yield type I and II errors. This presentation describes a way to combine strong aspects of both SEM types through PLSF-SEM, implemented through the software WarpPLS. PLSF-SEM builds on partial least squares (PLS) algorithms to generate correlation-preserving factors; the F refers to it being factor-based, as opposed to composite-based.

Keywords: WarpPLS, Multiple Regression, Partial Least Squares, Structural Equation Modeling, Multicollinearity

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Entrepreneurial Growth as Strategy: An Integrative Review and Agenda for Future Research

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Abstract

Organizational growth has been studied extensively, and in this overall body of work, researchers focus on how startups grow and continue to expand as they move through their life cycles. This interest in entrepreneurial firms and startups has led to a growing reference to the concept of entrepreneurial growth (EG). However, the construct of EG is unclear, and this insight led us to conduct a systematic literature review. Using the logic that organizational growth is a form of change, we utilized work done by Self et al. (2007) to frame our review. Using this research, we created a categorization scheme that focused on three proposed focus areas: content, context, and process. After thematically reviewing 100 articles and organizing them into these categories, the analysis found that the work on content and context is descriptive in nature, using the concept of entrepreneurial growth loosely to talk about other specific aspects of business growth. Entrepreneurial growth as process work, however, is unique, robust, and building toward a new area of research that suggests entrepreneurial growth as a unique strategy used by both new and established firms. We found that research conducted to date on entrepreneurial growth that is focused on the theme of growth as a process or strategy is more impactful for building new theories and research. Implications and future research directions are discussed.

Keywords: Entrepreneurship; Entrepreneurial Growth; Innovation; Human Capital; Change Management; Strategy

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Human Capital Expansion in the Form of Formal Education: A Key Promoter of Individual, National, and Regional Economic Growth and Development

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Abstract

This study presents an overview of the major factors contributing to national economic growth and development, and establishes human capital expansion as a pre-condition for economic growth. This study proposes the implementation of industrial policies geared towards the development of human capital, through investments in formal education, with the purpose of promoting economic growth and development at the individual, national, and regional levels.

I. Introduction

For decades, the efficient implementation of policies promoting economic growth and development at the national and regional levels has been investigated by economists and politicians throughout the world. As a result of the implementation of sophisticated econometric models and theories, we have drawn different conclusions concerning the variables with the most significant positive effect on economic growth and development. Some suggest that, at the national level, the most commonly noted promoters of economic growth and development are the accumulation of human capital, physical capital, and technological change (Besley & Burgess 2003), others have included redistributive policies, quality of institutions, and human capital on their list of promoters of economic growth and development (Eastley, 2007).

Interestingly, despite the fact that an abundant body of literature considers the development of human capital as a promoter of economic growth and development, this idea has seldom been at the center of policies promoting national and regional development. If viewed as an industry capable of providing handsome dividends for both individuals and society in general, human capital development, in the form of formal education, would take center place in our policy debates regarding the promotion of economic development around the world.

The story of success of Asian economies such as Taiwan, Korea, Philippines, and Japan can be linked to the fact that, when compared to similar economies prior to the 1960s, the most highly developed Asian economies today, had a disproportionately high level of investments in education in comparison to other similar economies (Mingat, 1998). As such, it is safe to infer that education is a pre-existing condition for economic growth and development. Consequently, it can be suggested that industrial policies be also implemented with formal education as a central promoter of economic growth in mind in other regions of the world.

Against this backdrop, the following sections present an overview of the major factors contributing to national and regional economic growth and development, followed by an analysis establishing human capital development as a pre-condition for economic growth. Subsequently, a synopsis of human capital theory, its history, and its main contributors is presented. The piece concludes by suggesting formal education as a promoter of human capital development, and hence, as a promoter of individual, national, and regional economic growth.

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II. Leading Factors Contributing to Economic Growth and Development

Historically, scholars have explored the complex, multilayered notion of economic growth and development, and have arrived at different conclusions concerning the key variables affecting them. In practical, specific terms, at the national level, the most commonly noted promoters of economic growth and development are investment in human capital, increasing savings and exports, import substitution, labor-intensive techniques, income redistribution, provision of basic needs to the poor, allowing markets to define prices and the allocation of resources, and more recently, the replacement of free market by central planning (Barro, 1997; Lim, 1996; Perkins, et al., 2001; Ray, 1998).

Ray (1998) proposed that no single factor is fully responsible for national development and economic growth. Perkins, et al. (2001), in agreement with Ray, states that, apart from no single factor being responsible for growth and development, “no single policy or strategy can set in motion the complex process of economic development” (p. 24). In other words, apart from development not being the result of single factors acting independently, no one specific policy or strategy is sufficient to promote growth and development. There are factors and policies that, when implemented in the right context, would result in actual development. Therefore, the understanding of the particular context is vital for the development and implementation of policies geared towards national growth and development. “[A] wide variety of explanations and solutions to the development problem makes sense if placed in the proper context and makes no sense at all outside that set of circumstances” (p. 24).

Despite the fact that no single factor or policy alone would be sufficient to promote development, through detailed observation and study, some have concluded that there is a small number of variables that, when combined in the right proportion, might further growth and development. Besley and Burgess (2003) viewed the accumulation of human capital, physical capital, and technological change as the main elements promoting growth and development. Also, when observing the main components of growth and development, Easterly (2007) concluded that the three main promoters of growth and development are redistributive policies, quality of institutions, and human capital. Both, Besley and Burgess (2003), and Easterly (2007) concurred that human capital is a determinant factor of growth and economic development.

III. Human Capital Development: A Pre-Condition for Growth

Educational Policies in High-Performing Asian Economies

After conducting a longitudinal study observing three decades of history in high-performing Asian economies, Mingat (1998) stated that despite the fact that economic growth has not always promoted more egalitarian societies, high-performing Asian economies have implemented, explicitly or implicitly, a variety of national policies that have fostered this positive outcome. “General macroeconomic policies (savings and investment policies, export oriented regulations, etc.) have obviously played a role” (p. 696) in this economic growth. However, these countries, instead of putting general democratic principles into action, have, in a sense, “adopted a more pragmatic approach by getting the population to adhere to global policies”(p. 696) to assure that all members of society will benefit from economic growth. Mingat later states that one of the factors most likely to explain the economic growth in East Asia since the 1960s has been the investment in human resource development.

When compared with countries with similar per-capita income more than three decades ago, most high-performing Asian economies had a higher level of investment in education than their counterparts. For example, according to Mingat, around 1950-1960, Pakistan, China, India and Indonesia had relatively modest coverage in primary schooling, while Japan, Korea, the Philippines and Taiwan, already had almost universal coverage for primary schooling. It seems that, according to Mingat’s observations, investment in education is a pre-condition for economic growth. Lim (1996) arrived to the same conclusion and observed that “the rapid growth of the Japanese and

Korean economies probably owed much to the mass literacy and numeracy achieved early in the process” (p. 149)

Rodrik (1995) after studying Korea’s and Taiwan’s economic growth since the early 1960s concluded that, even though it is believed that these countries heavy emphasis on export orientation played a significant causal role in their growth, the already existing extremely well educated labor force relative to their physical capital stock is a more likely cause for their astounding economic growth. When comparing these countries with similar economies in per capita income levels, Rodrik found that both, Korea and Taiwan “had virtually universal primary school enrolment, while the norm for countries at their income levels stood at around 60% only. Korea had more than double the literacy rate compared to the norm, and Taiwan’s literacy rate was one-and-a-half times as high. It is clear that both countries had a labor force that was considerably better educated than would be predicted from their income levels” (p. 76).

If the development of human capital is viewed from the perspective of an industry, industrial policy (defined by Pack and Saggi (2006) as any type of selective intervention of government policy that attempts to alter the sectoral structure of production toward sectors that are expected to offer better prospects for economic growth) could be geared towards the development of human capital with the purpose of promoting economic growth. Consistent with Rodrik and Mingat, Pack and Saggi also observe that in India, “the preconditions for development of the software sector were high quality education” (p. 35). When observing the preexisting conditions for economic growth and development, it seems clear that a more highly educated population will be most likely to take advantage of economic growth opportunities when they appear. Rodrik, Mingat, Lim and Pack and Saggi agree upon the fact that education is a pre-existing condition for economic growth and suggest that industrial policies be implemented with education as a promoter of growth in mind.

IV. An Overview of Human Capital Theory

Through the previous section, it has been established that human capital development is essential, and a pre-existing condition, to economic growth. The following section focuses on human capital theory, its history, and its main contributors.

At this point, it would be convenient to reiterate the fact that human capital may be defined as “the value that markets place on the work done by individuals who have invested in varying amounts of formal schooling, formal on-the-job training, and informal training” (Carnoy, 1995, p. 9). The concept of human capital is certainly not a recent development. Originators of this idea, such as Adam Smith (1776) and Heinrich Von Thünen (1826) suggested that an individual’s talents obtained through education or experience contribute to not only the individual’s wealth, but also to the wealth of the society to which they belong. The pioneers of human capital theory also suggested that human talent and capacity may be compared to machinery or any other type of capital that facilitates labor and repays its expense with profits (Cohn & Geske, 1990).

Building upon the foundation laid by Smith and Thünen, Becker (1964) and Schultz (1971) contributed to the development of human capital theory. Becker (1964) observed that the growth of physical capital alone “explains a relatively small part of the growth and income in most countries” (p. 1) and suggested the existence of “a tremendous amount of circumstantial evidence testifying to the economic importance of human capital, especially of education”. According to Becker, the most impressive difference made by human capital is seen in the earnings differential between the educated and the uneducated.

Schultz (1971) explained that his observations of the contributions of the sciences to production arouse in him a curiosity, as he observed that advances in the sciences *per se* could not explain total gains in productivity. He then viewed the role of the acquired abilities of human agents as a major source of these gains in total productivity. Later, he concluded that “the traditional concept of capital had to be extended to make room for human capital” (p. v). As a result of these observations and his own studies, Schultz saw the inadequacies of the traditional concept of capital of his times and suggested the heterogeneity of capital; human capital being one of its many components. When observing that income levels increased with increased

investments in education by individuals, irrespective of their race and gender, Schultz was able to suggest that education is the major contributor to wage differentials among individuals. Also, Schultz concluded that when education is observed and treated as an industry producing a specific output, it is easier to observe the results of investing in this particular industry.

In recent years, literature has increased exponentially in support of human capital development and its unquestionable positive effect on economic growth. Human capital theory perfectly filled the previously existing void, explaining how human capital must be treated as one of the components of the multifaceted, heterogeneous definition of capital. Additionally, human capital theory is consistent with the suggestions of Rodrik (1995), Mingat (1998), Lim (1996) and Pack and Saggi (2006) proposing that industrial policies on education be implemented as promoters of economic growth. And finally, as suggested by Becker (1964) and Schultz (1971), in order to be efficient, education must be studied and treated as any other industry contributing to the economic growth and development of nations.

V. Formal Education: A Fundamental Player in Human Capital Development

As stated in the previous sections, human capital is a factor with a significant impact on economic growth and development. And although human capital may be invested in many different ways, such as work experience and on-the-job training, formal education provides a pragmatic approach to human capital development. From a human capital theory's perspective, education, in general, may be defined as "the investment of current resources (the opportunity cost of the time involved as well as the direct costs) in exchange for future returns" (Harmon, et al., 2003, p. 116).

Numerous studies on investments in education provide evidence supporting the positive effects of these investments on human capital development, productivity, and growth (Carnoy, 1995b; Cohn & Geske, 1990; Harmon, et al., 2003; Johnes, 1993; Levin & Shank, 1970; Norman, 1976; Psacharopoulos, 1973). Hicks (1995), after a detailed surveying of the available literature on human capital and growth, concluded that formal education is a major factor in improving human capital. Furthermore, Barro and Lee (2001) also concluded that human capital, "particularly that attained through education, has been emphasized as a critical determinant of economic progress" (p. 541).

Investments in education produce benefits at many levels. Lim (1996) established that investments in education contribute to economic growth in ways such as increasing the quality of the labor force, promoting the division of labor, enabling new information to be absorbed faster, leading to a more efficient allocation of resources, removing many social and institutional barriers, and encouraging entrepreneurship. Lim also suggested that in most instances, returns to investments in education "exceed the corresponding rates of return on alternative forms of investment" (p. 148). McMahon (2002) also emphasized the social benefits of investments in education and observed both, the monetary and non-monetary benefits of these investments. The social, non-monetary benefits of investments in education suggested by McMahon are increases in overall population health (i.e. reduced infant mortality, increased life expectancy), democracy, human rights and political stability, as well as benefits to the environment as a whole through reduced waste and pollution.

In terms of both, labor productivity and income, public expenditure in formal education is suggested to be money well spent. At the national level, Barro (1997) establishes that "an extra year of male upper-level schooling is ... estimated to raise the growth rate by a substantial 1.2 percentage points per year" (p. 19). Additionally, the Organization for Economic Co-operation and Development (OECD) has shown that for certain countries, rising labor productivity accounted for at least half of Gross Domestic Product (GDP) per capita growth. Furthermore, and also at the national level, OECD has demonstrated that the long-term effect on economic output increases between 3 and 6 percent per additional year of formal education (2004).

When referring to the effects of education on private income, Duflo's conclusions are even more optimistic. She contended that every additional year of formal education accounts for 6 to 10 percent increase in earnings (2001). Furthermore, Sherman's report on the costs of child poverty, prepared for the Children's Defense Fund (1994), stated that, on average, each year of

education has the potential to increase a worker's hourly wages by 10 percent. This percentage return to investments in education is consistent with the results of studies on returns to education conducted from the 1970s (Mincer, 1974) to as recently as 2010 (Patrinos & Psacharopoulos, 2010). Investment in human capital, in the form of formal schooling, has been concluded to have a positive effect on economic growth at the regional, national, and individual levels.

VI. Conclusion

National investments in formal education have proven to be money well spent. Numerous studies have concluded that human capital, in the form of formal education, is a major contributor to individual, national and regional economic growth and development (Carnoy, 1995b; Cohn & Geske, 1990; Harmon, et al., 2003; Johnes, 1993; Levin & Shank, 1970; Norman, 1976; Psacharopoulos, 1973). Stable Asian economies such as Japan, Korea, Philippines, and Taiwan have demonstrated that industrial policies implemented with education as a promoter of growth in mind, have resulted in a more highly educated society which will be most likely to take advantage of economic growth opportunities when they appear.

Returns to investments in education have been found to exceed the corresponding returns to alternative forms of investment (McMahon, 2002). Moreover, in addition to the tangible private benefits of education (e.g. increased wages), the social benefits of these investments include increases in overall population health, democracy, human rights, political stability, as well as benefits to the environment as a whole through reduced overall waste and pollution. This study proposes the implementation of industrial policies geared towards the development of human capital through investments in formal education with the purpose of promoting economic growth and development at the individual, national, and regional level.

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Estimating How Firm Characteristics Affect Corruption Using Enterprise Survey Data

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Abstract

The World Bank Enterprise Surveys contain several questions about corruption. One popular question asks how much ‘establishments like this one’ typically pay in bribes. The manager can answer in two ways: as a percent of sales or in local currency. In principle, the manager’s response should not depend upon how they answer. In practice, it does. Managers who answer as percentages report paying far more than managers who answer in local currency. This paper shows this holds in most countries. Further, it proposes a way of estimating the difference and other model coefficients taking this into account. Hypothesis tests consistently favor the modified model over a simple model that does not control for the different reporting methods.

I. Introduction

Numerous papers study corruption’s causes and consequences using data from the World Bank’s Enterprise Surveys [WBES] (Xu, 2011).² As well as having familiar problems related to sensitivity, the WBES’ main question about corruption has a lesser known problem. The survey allows managers to answer in two ways: in local currency or as a percent of sales. Letting managers choose how to respond would not affect how much they reported paying if managers diligently calculated payments and divided these payments by sales. The way they respond, however, matters. Using Enterprise Surveys from 15 African countries, Clarke (2011) shows managers who answer as a percent of sales report paying 4 to 15 times more than managers who answer in local currency.³

Although it is unclear why managers who answer in local currency claim to pay less than managers who respond in percentages, Clarke (2011) rules out some plausible explanations. First, the lower bribes are not because of observable or unobservable firm attributes. Firms that respond in local currency claim to pay less after controlling for observable firm characteristics. Further, they also claim to pay less in panel regressions that control for unobservable firm characteristics with firm fixed effects. Second, they do not claim to pay less because of something specific about corruption; firms answering in local currency also report lower amounts when responding to less sensitive questions about power outages and security. Clarke (2011, p. 1128) concludes it is most likely that “firm managers might not accurately estimate amounts in percentage terms.” Managers might give incorrect answers because they cannot estimate percentages in their heads, conflate revenue and profits when answering, or answer without even trying to calculate exact numbers.

This paper further explores why managers who respond in local currency report paying less than managers who respond as a percent of sales. We contribute to the literature in two ways. First, we show managers who respond in local currency say they pay less almost everywhere where enough firms answer both ways; the difference is thus not unique to Africa. Second, the paper proposes a modified Tobit model that allows managers to report different amounts when

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² The Enterprise Survey website (www.enterprisesurveys.org) has a long—although not exhaustive—list of over 750 studies using Enterprise Survey data to examine firm behavior and performance. Of these, more than seventy-five focus on corruption. Other studies use data on corruption as control variables.

³ Other papers have also noted this inconsistency (Breen and others, 2017; Malomo, 2013).

they answer in different ways. The model will enable us to assess how much firms overestimate payments more rigorously than earlier papers do. Moreover, it lets us estimate how other firm characteristics affect bribes more accurately than approaches that do not consider the different responses.

II. Data

This paper uses data from the World Bank Enterprise Surveys (WBES) to look at how firms answer questions about bribes.⁴ The WBES covers private firms with more than five employees in manufacturing, services, and retail and wholesale trade.⁵ We use data from the 286 surveys from 145 mostly low and middle-income countries conducted between 2005 and 2020.

Question about bribes

The question that we use to estimate bribes is:

(j.7) We've heard that establishments are sometimes required to make gifts or informal payments to public officials to "get things done" with regard to customs, taxes, licenses, regulations, services etc. On average, what percent of total annual sales, or estimated total annual value, do establishments like this one pay in informal payments or gifts to public officials for this purpose?

Rather than asking about the firm's bribe payments, the question asks about other firms' payments. The WBES poses the question indirectly to allow managers to answer without admitting to illegal or immoral acts (Iarossi, 2006). This deniability might encourage managers to tell the truth.⁶ However, indirect questions are difficult to interpret. In this case, researchers cannot know whether managers answer thinking about their firm's behavior or their beliefs about other firms' behaviors.⁷ Further, the evidence on whether indirect questions encourage candid responses is mixed (Clarke and others, 2015).

For ease of exposition, this paper follows the usual practice of discussing results as if managers answer indirect questions thinking about their firm's behavior.⁸ For example, if the exporting dummy's coefficient is positive, we will say exporting firms pay higher bribes than non-exporting firms. Writing this way is more straightforward than saying exporting firms' managers believe firms like theirs pay higher bribes than non-exporting firms' managers.

This paper, however, focuses on the question's second notable feature: managers can answer either as a percentage of sales or in local currency. Of the 131,476 firms that answered the question, 111,450 claimed firms like theirs do not pay bribes, 15,131 answered as a percent of sales, and 4,895 answered in local currency.⁹ As discussed earlier, although the manager's response should be identical however they answer, earlier studies have found the response method matters.

⁴ The data are available for free on the World Bank Enterprise Survey website (www.enterprisesurveys.org).

⁵ The sampling frames only include firms with some private owners. The survey should, therefore, omit fully government owned firms. This exclusion, however, was incomplete; 69 of 159,205 firms reported the government was their sole owner.

⁶ Because paying bribes is often illegal, and most people see it as immoral, managers often lie about bribing officials (Azfar and Murrell, 2009; Kraay and Murrell, 2016).

⁷ Fisher and Tellis (1998) argue indirect questions "may introduce attitude-irrelevant variance as respondents try to make accurate predictions about the third party specified in the indirect question." (p. 563).

⁸ Most researchers who use this or similar indirect questions assume, either implicitly or explicitly, managers answer thinking about their own firm. Treisman (2007), for example, notes that although most surveys phrase questions indirectly about what other firms do, "it is hoped and assumed that respondents reply based on their own experience" (p. 214).

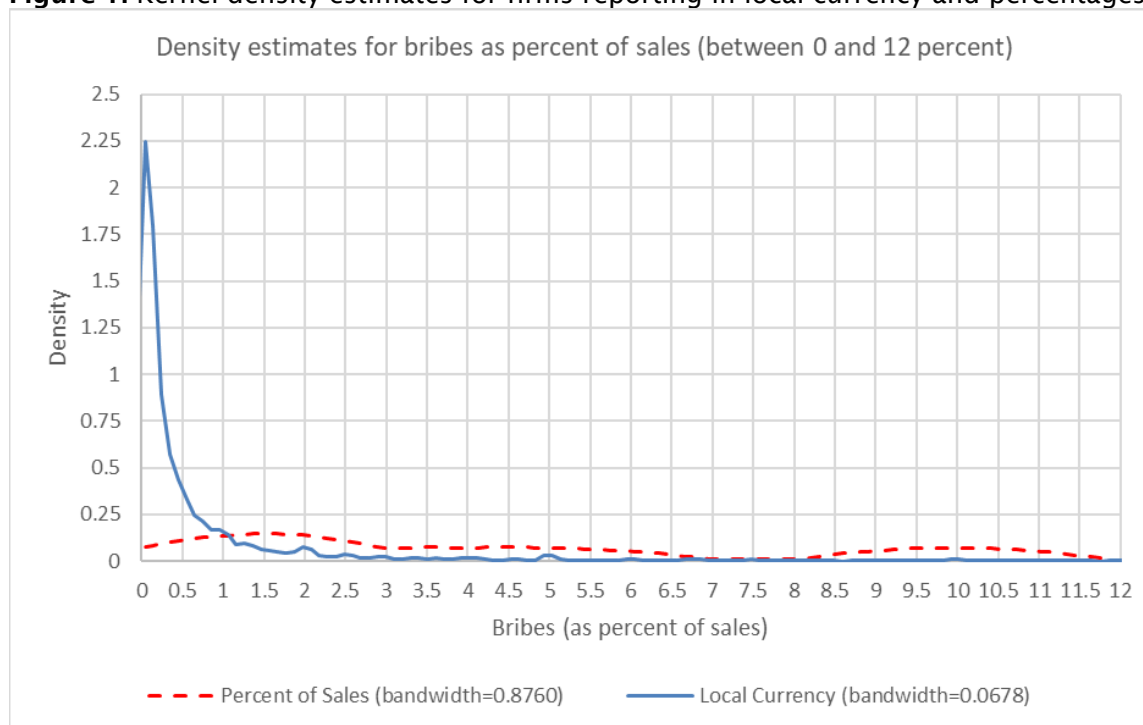
⁹ An additional 1517 firms have payments reported as both percent of sales and in local currency. Most are in four countries where all—or most—firms have bribes reported in both ways (Kenya 2007, Nigeria 2007, Lao PDR 2009, and Cambodia 2007). It seems likely that the survey firm calculated payments in the other way either during or after the interview. Because we cannot be sure how the managers answered, we excluded these 1517 firms from the analysis.

Bribe payments by firms reporting in local currency and as percentages

Using WBES data from 15 Sub-Saharan African countries, Clarke (2011) found firms that report bribes in local currency claim to pay lower bribes than firms that report bribes as a percent of sales. The difference stays significant after including firm-level controls and fixed effects, suggesting the difference is not due to observed or unobserved differences between firms. The paper also shows the difference is not due to sensitivity or the question's indirect format. Other WBES questions that allow respondents to choose how they answer—on power outages, crime, and security costs—show similar differences even though these other questions are neither indirect nor sensitive.

Clarke (2011) argues it is unclear why firms that answer in local currency report paying lower bribes. If managers who reported bribes as percentages calculated percentages by dividing bribes by sales, then the reporting method should not matter. That the method does matter suggests managers who answer as percentages are not calculating percentages in this manner.

Figure 1: Kernel density estimates for firms reporting in local currency and percentages.



Note: Density estimates use the Epanechnikov kernel and each subsample's optimal bandwidth (Silverman, 1986). Because the distribution is more spread out for the firms that reported amounts as percentages, the bandwidth is wider for these firms leading to a smoother density estimate. Density estimates are calculated using all observations that report positive bribes that are equal to less than or equal to 100 percent of sales. Firms that reported no bribes are excluded because we do not know whether they would have reported bribes as percent of sales or in local currency. Outliers that reported bribes greater than 100 percent of sales are excluded from the estimation (10 observations of over 21,000 reporting positive amounts). In the graph, density estimates for above 12 percent of sales are not shown for presentational purposes because the estimates are zero or close to zero.

This paper extends Clarke's (2011) analysis by expanding the sample from 15 African countries to 145 mostly middle- and low-income countries throughout the world.¹⁰ The results confirm that firms that answer in local currency report paying less than firms that answer as a

¹⁰ The paper includes firms from 286 WBES surveys in 145 countries.

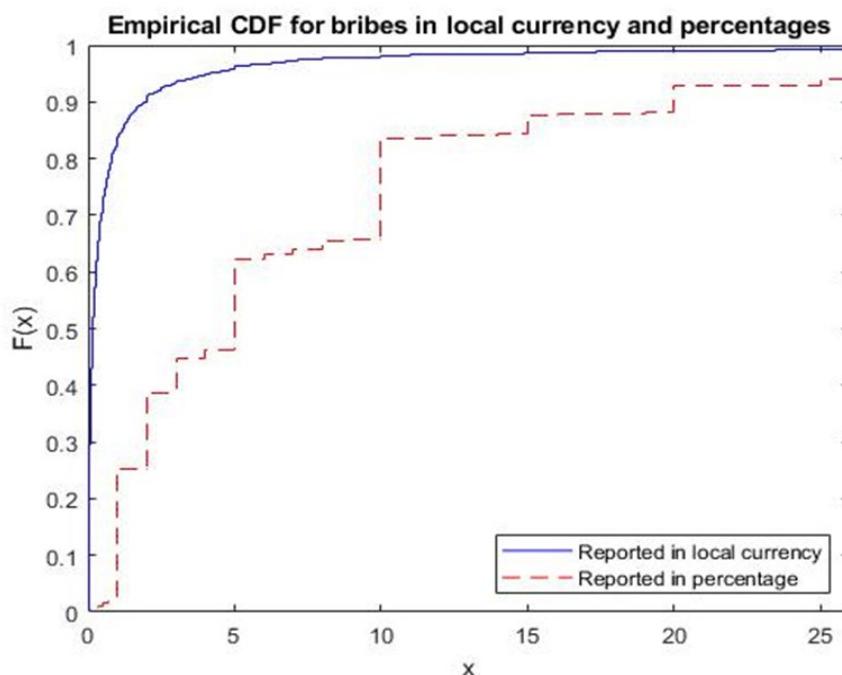
percent of sales outside of Sub-Saharan Africa. The median firm that reported bribes as a percent of sales said bribes were about 5 percent of sales. By comparison, the median firm that reported bribes in local currency said bribes were about 0.16 percent of sales. The same is true at other percentiles (see Table 1). Figure 2 shows probability density estimates for firms reporting in local currency and as a percent of sales. For firms that report in local currency, the peak is 0.04 percent of sales. For firms that report as percentages, the peak is 1.5 percent.

Table 1: Summary Statistics for bribe payments for firms reporting payments in different ways

Group	Percent of sales	Local Currency	Local Currency, Outliers Excluded
Observations	15,131	4,905	4,895
Percentiles			
1%	0.400	0.000	0.000
5%	1.000	0.003	0.003
10%	1.000	0.009	0.009
25%	1.000	0.045	0.044
50%	5.000	0.164	0.164
75%	10.000	0.600	0.600
90%	20.000	2.000	1.986
95%	30.000	4.167	4.167
99%	70.000	24.000	20.833
Other Stats			
Mean	8.5	43.3	1.2
Std. dev.	13.0	2782.2	5.6

Note: Outliers are firms that reported bribe payments of more than 100 percent of sales. This only affects firms that reported in local currency because no firms that reported as percent of sales reported sale greater than 100 percent of sales.

Figure 2: Empirical cumulative density function for firms reporting in local currency and percentages.



Note: Figure is truncated at 26 for visual purposes. Figure shows the percent of firms that report bribes less than or equal to x percent of sales for firms that reported bribes as a percent of sales and that reported bribes in local currency.

The empirical cumulative distribution function (CDF) further confirms how different the answers are for firms using different reporting methods (see Figure 2). About 82 percent of firms that answered in local currency reported bribes were less than 1 percent of sales. By comparison, only 1.8 percent of firms that answered as percentages reported the same.

The empirical CDF shows a second anomaly; nearly 85 percent of firms that answered as percentages gave seven specific round numbers (1, 2, 3, 5, 10, 15, and 20 percent). These round numbers suggest the percentages are only rough estimates. Moreover, firms are not simply rounding to the closest integer. If they were, similar numbers of firms should report bribes of 4 or 6 percent of sales (1.5 and 0.8 percent of firms) as 5 percent (16.1 percent). Likewise, similar numbers of firms should answer 9 or 11 percent of sales (0.5 and 0.1 percent) as 10 percent (17.8 percent). The clumping at specific round numbers suggests respondents are not calculating precise results.

A final observation is the sample has several extreme outliers among the firms reporting bribes in local currency. Ten of the 5,080 firms that reported bribes in local currency claimed bribes exceeded their sales—something no firm reporting as percentages did.¹¹ Because about 15,000 firms reported bribes as percentages and about 5,000 reported bribes in local currency, these outliers do not affect the quantile estimates; they do, however, affect means. One firm, which reported annual sales of less than \$1, reported bribes were close to 200,000 percent of its sales. Including this single firm increases the mean for firms reporting in local currency from 3.6 percent to 43.3 percent of sales. Given that less than 0.5 percent of firms reported bribes greater than 43.3 percent of sales, this one observation disproportionately affects the mean.

We, therefore, exclude firms that reported bribes above 100 percent of sales—10 of about 130,000 firms.¹² Excluding these estimates seems reasonable because they are probably due to mistakes during data entry or due to respondents exaggerating. Even if correct, these outliers would reflect idiosyncratic firm characteristics the model would be unlikely to explain.

III. Econometric Model

As noted above, managers who reported payments in local currency reported paying lower bribes than managers who reported payments as a percent of sales. This section sets up a modified Tobit model that allows us to estimate the extent to which the reported payments differ. As a first step, we assume firm i in country c in period t 's desired payment, y_{ict}^* , depends on firm and country characteristics:

$$y_{ict}^* = \beta x_{ict} + \lambda_{ct} + \varepsilon_{ict}$$

The firm-level controls (x_{ict}) include controls for exporting, firm size, foreign ownership, and the government ownership. Studies looking at how much firms pay in bribes often include similar controls.¹³ Since desired payments might vary over time and across countries, we also include a fixed effect for each individual survey (λ_{ct}). When the World Bank has surveyed a country multiple times, the model includes separate dummies for each survey.

Since firms cannot pay negative bribes, the bribe payment is censored below at 0. The actual payment, y_{ict} , is therefore:

¹¹ 0.1 percent of firms that reported bribes in local currency and 0.67 percent that reported bribes as percentages reported bribes equal to 100 percent of sales.

¹² The model does not converge if we include these observations.

¹³ For example, Breen and others (2017) include similar variables. The main differences with the specification in this paper is that we use workers rather than sales as a proxy of firm size, we omit female ownership, and we include country-time dummies rather than macroeconomic control variables. We use workers because it is available for more firms and omit female ownership because it was not available in the earliest surveys. We include country-time dummies because they control better for country-level differences than country-level variables do.

$$y_{ict} = \begin{cases} y_{ict}^* & \text{if } y_{ict}^* > 0 \\ 0 & \text{if } y_{ict}^* \leq 0 \end{cases}$$

As discussed above, firms that report payments as a percent of sales claim to pay significantly higher bribes than firms that report payments in local currency. To control for the possibility that firms that report in percentage terms (local currency) over-report (under-report) payments, we allow firms that report in percentage terms to report a multiple of their actual payment ($\kappa \cdot y_{ict}$) rather than their actual payment (y_{ict}), where κ is an unknown constant.¹⁴

Letting y_{ict}^r be the reported bribe payment and $I_c = 1$ be an observed dummy indicating the person reported the payment in local currency, the reported payment becomes:

$$y_{ict}^r = \begin{cases} \kappa y_{ict}^* & \text{if } y_{ict}^* > 0 \text{ and } I_c = 0 \\ y_{ict}^* & \text{if } y_{ict}^* > 0 \text{ and } I_c = 1 \\ 0 & \text{if } y_{ict}^* \leq 0 \end{cases}$$

If the person reports the payment in cash ($I_c = 1$), then $y_{ict}^r = \beta x_{ict} + \lambda_{ct} + \varepsilon_{ict}$. Assuming ε_{ict} has a normal distribution with a standard deviation of σ , $y_{ict}^r \sim N(\beta x_{ict} + \lambda_{ct}, \sigma^2)$ for firms reporting in cash. If the person reports the payment in percentage terms, then $y_{ict}^r = \kappa \beta x_{ict} + \kappa \lambda_{ct} + \kappa \varepsilon_{ict}$, implying $y_{ict}^r \sim N(\kappa \beta x_{ict} + \kappa \lambda_{ct}, \kappa^2 \sigma^2)$. Note that $\kappa \cdot y_{ict}^* > 0$ if and only if $y_{ict}^* > 0$ when $\kappa > 0$.

Because the coefficients and standard errors are both κ times bigger for firms reporting percentages, it doesn't matter whether people who report no bribes would have reported in local currency or as a percentage.¹⁵ That is, $\Phi\left(\frac{\kappa(\beta x_{ict} + \lambda_{ct})}{\kappa \sigma}\right) = \Phi\left(\frac{\beta x_{ict} + \lambda_{ct}}{\sigma}\right)$, where $\Phi(\cdot)$ is the cumulative distribution function of a standard normal distribution.

Letting $\phi(\cdot)$ represent the probability distribution function for a standard normal distribution, the log-likelihood function for firm i in country c at time t is:

$$\begin{aligned} \ln L_{ict} = & I(y_{ict}^* \leq 0) \cdot \ln\left(1 - \Phi\left(\frac{\beta x_{ict} + \lambda_{ct}}{\sigma}\right)\right) \\ & + I(y_{ict}^* > 0 \text{ and } I_c = 1) \cdot \left(\phi\left(\frac{1}{\sigma}(y_{ict}^r - \beta x_{ict} - \lambda_{ct})\right) - \frac{1}{2} \ln(\sigma^2)\right) \\ & + I(y_{ict}^* > 0 \text{ and } I_c = 0) \cdot \left(\phi\left(\frac{1}{\sigma \kappa}(y_{ict}^r - \kappa \beta x_{ict} - \kappa \lambda_{ct})\right) - \frac{1}{2} \ln(\kappa^2 \sigma^2)\right) \end{aligned}$$

We estimate the model using the ml package in Stata (Gould and others, 2010).

We have discussed the model as if people who report payments in local currency report accurately, while people who report payments as percentages report inaccurately. In practice, it does not matter who misreports payments. If we assumed that people who report bribes as percentages reported accurately, we would get:

$$y_{ict}^r = \begin{cases} \kappa^* y_{ict}^* & \text{if } y_{ict}^* > 0 \text{ and } I_c = 1 \\ y_{ict}^* & \text{if } y_{ict}^* > 0 \text{ and } I_c = 0 \\ 0 & \text{if } y_{ict}^* \leq 0 \end{cases}$$

¹⁴ We do not force κ to be greater than one. If people who reported in percentage terms reported, on average, lower payments than people who reported in cash, it would be smaller than one. Since all people reported positive or zero bribes, it should be positive (i.e., $\kappa > 0$).

¹⁵ The implied underlying model is different in Clarke (2011). Clarke (2011) allowed only the intercept to differ for people reporting in local currency. In a Tobit model, allowing only the intercept to differ would mean the reporting method would affect whether the person reported paying no bribes. This assumption is problematic because we do not know how people who said they did not pay bribes would have reported bribes.

When we estimate this model, the estimates for β , λ , and σ are the coefficients from the earlier model multiplied by κ and the new coefficient κ^* equals $\frac{1}{\kappa}$. This means the estimated marginal effects of the controls are larger in the second model.

IV. Empirical Results

Simple Tobit vs. Modified Tobit. Columns (1) and (2) of Table 2 show results from the simple and modified Tobit regressions. In the modified model, we assume people who report bribes as percentages misstate what they pay.¹⁶ As discussed earlier, the model would be identical if we assumed people who report bribes in local currency misstate payments. Both models include country-year dummies—separate dummies for each survey—and some standard firm-level controls.

The most interesting coefficient is kappa (κ), which measures how much managers who answer as a percent of sales over- or under-report payments compared with managers who answer in local currency. The point estimate is 3.02, suggesting managers who responded in percentages reported paying over three times as much as managers who responded in local currency. A Wald test rejects the null hypothesis that κ equals 1 ($\chi^2[1] = 2955$, p-value = 0.000). We, therefore, reject the null hypothesis that the two groups report paying similar amounts after controlling for differences between them. This test, and a similar likelihood ratio test, favors the modified over the simple Tobit model (see Table 2).

Table 1: Pooled results for simple Tobit and modified Tobit models.

	Tobit	Modified Tobit	Modified Tobit (inverted)
Observations	128,248	128,248	128,248
Country Dummies	Yes	Yes	Yes
Workers (nat. log)	-0.157*** (-2.60)	-0.0722*** (-3.11)	-0.218*** (-3.11)
Firm exports (dummy)	1.824*** (9.43)	0.694*** (9.32)	2.099*** (9.35)
Foreign ownership share (%)	-0.0117*** (-3.82)	-0.00452*** (-3.86)	-0.0137*** (-3.86)
Government ownership share (%)	-0.0066 (-0.57)	-0.0038 (-0.85)	-0.0115 (-0.85)
Manufacturing firm (dummy) ^a	0.528*** (2.79)	0.205*** (2.83)	0.621*** (2.84)
Service firm (dummy) ^a	1.517*** (6.84)	0.586*** (6.88)	1.773*** (6.90)
Constant	15.42*** (8.67)	4.956*** (7.22)	14.99*** (7.26)
Sigma	15.90*** (178.16)	6.08*** (94.67)	18.39*** (153.13)
Kappa		3.02*** (80.81)	0.33*** (80.81)
Log-likelihood	-107596	-104863	-104863
Hypothesis Test: Kappa = 1			
Likelihood ratio test ($\chi^2[1]$)		5466	
(p-value)		(0.000)	
Wald Test ($\chi^2[1]$)		2925	
(p-value)		(0.000)	

Note: ***, **, * Statistically Significant at 1%, 5% and 10% significance levels. Source: Author's calculation based upon data from the World Bank's Enterprise Surveys. ^a Omitted category is retail trade.

¹⁶ As noted above, κ can take any value between 0 and ∞ . If $0 < \kappa < 1$, people who answer in percentages report lower payments than people who report in local currency. If $1 < \kappa < \infty$, they report higher payments.

Although these results support the idea that managers who report bribes as percentages overstate their payments, we could interpret them differently. The model is also consistent with managers who report in local currency understating payments. We can reestimate the model assuming firms that report bribes as percentages report accurately, while firms that report in local currency underreport payments. With this setup, κ^* equals $1/\kappa$ from the original model. Similarly, the coefficients on the independent variables, β^* , equal $\kappa\beta$ from the original model.¹⁷ Column (3) shows these results.

Coefficients on control variables. Both the modified and simple models lead to similar conclusions about who pays bribes. The export dummy, foreign-ownership dummy, and the number of employees have significant coefficients in both models. These results imply exporters pay more than non-exporters, foreign-owned firms pay less than their domestic rivals, and large firms pay less than small firms. In contrast, the government ownership dummy's coefficient is insignificant in both models, suggesting partly government-owned firms pay similar amounts to fully private firms.

Although the two models' results are similar qualitatively, they differ quantitatively. Firm size, foreign ownership, and export status affect bribes far more dramatically in the simple model. For example, the marginal effect of foreign ownership is 2.6 times greater in the simple model.¹⁸

V. Discussion and Conclusions

This paper contributes to the literature on corruption in several ways. First, it confirms that Clarke's (2011) results for WBES surveys for fifteen sub-Saharan African countries hold in almost all WBES surveys. Managers who report bribes as a percent of sales claim to pay three times more than similar managers who report bribes in local currency. The difference in reported bribes is statistically significant in the pooled sample and most countries with sufficient data. Researchers using WBES data to study corruption's causes and consequences should, therefore, control for how managers answer the question.

Second, the paper suggests a new, more consistent approach to modeling managers' different responses. Clarke (2011) includes a dummy showing whether the manager answered in local currency or percentages.¹⁹ Including a dummy, however, is problematic in a simple Tobit model because it means that how the manager answers might affect whether they admit to paying bribes or not. The Tobit model could imply that the same manager would deny bribing officials when answering in local currency but confess when answering in percentages. This paper's model avoids this problem.

Third, the paper estimates how other variables affect bribes after controlling for how the manager answered. The modified model suggests firm characteristics affect bribes less than a simple Tobit model would. However, these lesser effects will only be correct if firms answering as percentages overestimate bribes. The effects will be larger if firms answering in local currency underestimate bribes instead. However, we believe firms answering in percentages are more likely to overreport bribes than firms answering in local currency are to underreport them for reasons discussed below.

Although the paper extends earlier work, it has several limitations. First, it does not resolve which managers answer accurately. Managers answering in local currency might downplay corruption, or managers answering as percentages might exaggerate it.²⁰ The paper's model cannot distinguish between these two possibilities. We can transform parameters from a model where managers answering in local currency underreport to parameters from a model where managers answering in percentages exaggerate. But we need to know which managers are

¹⁷ Because the coefficients and κ are rounded to three decimal places, the calculations are not exact.

¹⁸ The marginal effect compares the effect of the independent variable on the underlying dependent variable, y^* .

¹⁹ Clarke (2011) also ignores firms that did not pay bribes by dropping firms where the manager said the firm did not pay bribes and estimating an OLS model.

²⁰ Further, both may be true—managers who answer in percentage terms might overestimate bribes, and managers who answer in local currency underestimate them.

answering accurately to assess how much bribes cost firms and how firm characteristics affect bribes.

Second, the paper fails to explain why firms reporting in local currency claim to pay lower bribes than firms reporting in percentages. Clarke (2011) rejects some plausible ways of explaining the discrepancy. First, observed and unobserved differences between firms with different reporting methods do not explain the discrepancy. Second, the question's sensitivity does not cause it; Clarke (2011) finds similar inconsistencies for less sensitive questions. Understanding why the response method matters might help us figure out who is reporting accurately.

One plausible way to explain the difference is that respondents who answer in percentages do not calculate exact amounts. Instead, they give impressionistic answers intended to illustrate how serious corruption is. About 70 percent of respondents who answered as percentages answered 1 percent, 2 percent, 5 percent, or 10 percent of sales.²¹ These round numbers were far more common than other integers.²² For example, although 18 percent of firms reported bribes equal to 10 percent of sales, only 0.5 percent reported 9 percent and only 0.1 percent reported 11 percent. Similarly, although 16 percent of managers answered 5 percent, only 1.5 percent answered 4 percent, and 0.8 percent answered 6 percent. If managers answering in percentages give impressionistic answers, they might report 1 or 2 percent of sales—the smallest integer amounts possible—to imply bribes are not overwhelming.²³ Similarly, a manager reporting 5 or 10 percent of sales might be implying bribes are prohibitively costly.

Third, we could allow firm characteristics to affect whether the firm pays bribes differently than how much the firm pays. We could model the decision and extent decisions separately by adjusting Cragg's (1971) model to allow firms who report bribes differently to over- or underreport payments in the model's second stage.

Fourth, we could try to endogenize the decision on how to answer the question. In the analysis in this paper, we treat the decision on how to answer the question as exogenous. In practice, characteristics of either the firm or the respondent might affect whether the respondent answers in percentages or in local currency.²⁴ Allowing this to be determined endogenously might be useful.

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²¹ Moreover, 15 percent answered 3 percent, 15 percent, or 20 percent.

²² Only 2 percent of respondents gave non-integer answers. About 1.8 percent gave amounts less than 1 percent, and about .2 percent gave non-integer answers greater than 1 percent.

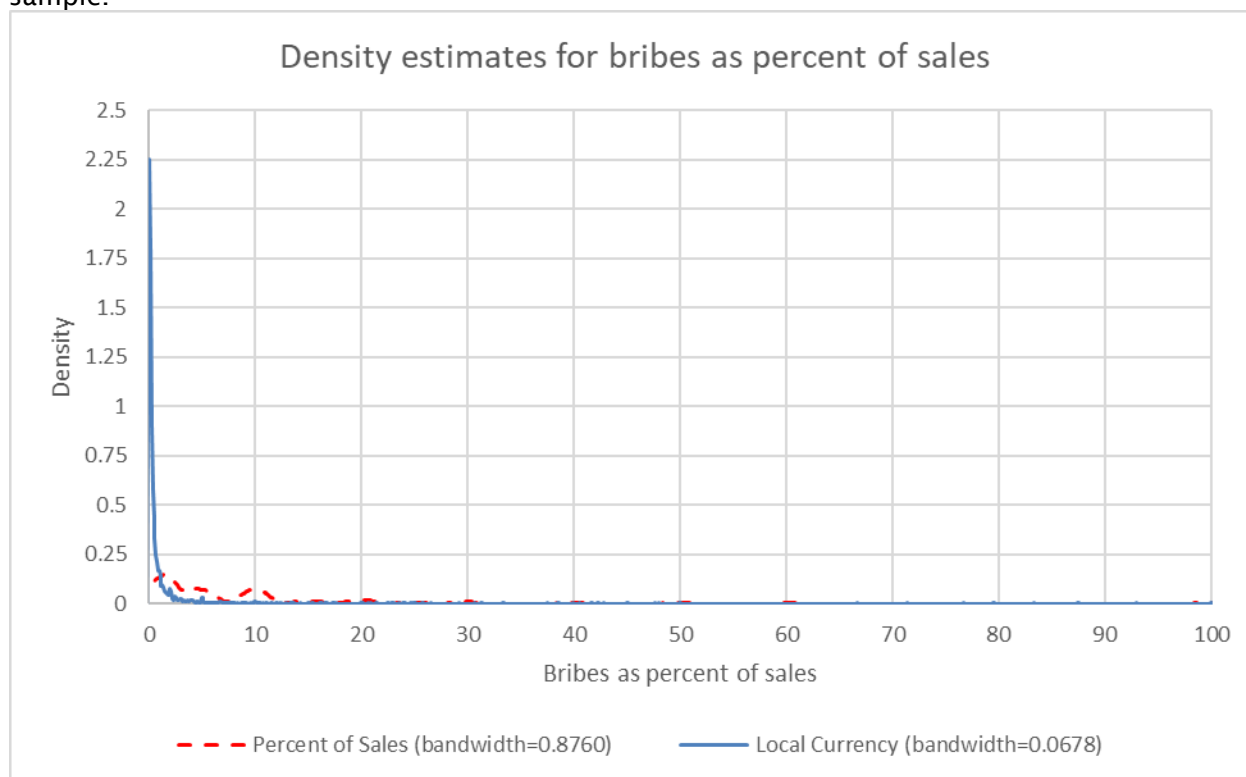
²³ In practice, however, managers reporting in local currency report paying less than 1 or 2 percent of sales. About 82 percent reported bribes of less than 1 percent of sales, and 90 percent reported bribes of less than 2 percent.

²⁴ One factor that does seem to play a role in how the respondent answers is the identity of the interviewer. Some interviewers appear to encourage answers in percentages and some do the same in local currency.

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Appendix

Figure 3: Kernel density estimates for firms reporting in local currency and percentages, full sample.



Note: Density estimates use the Epanechnikov kernel and each subsample's optimal bandwidth (Silverman, 1986). Because the distribution is more spread out for the firms that reported amounts as percentages, the bandwidth is wider for these firms leading to a smoother density estimate. Density estimates are calculated using all observations that report positive bribes that are equal to less than or equal to 100 percent of sales. Firms that reported no bribes are excluded because we do not know whether they would have reported bribes as percent of sales or in local currency. Outliers that reported bribes greater than 100 percent of sales are excluded from the estimation (10 observations of over 21,000 reporting positive amounts).

Boundary Crossing and Well-Being in Remote Work Context: The Moderating Role of Non-Work Role Re-Engagement (NWRR)

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Abstract

As businesses are going on around the clock and the prevalence of remote work arrangements is on the rise, the boundary between work and non-work context is blurring. As a result, workers often find themselves interrupted by their supervisors or colleagues during non-work hours. However, there is still much to learn about the impact of boundary-crossing activities on work-life balance, as well as how a remote worker's boundary management capacity may influence this impact. Drawn from boundary management theory, this paper proposes a process effect, through which remote work experience influences work-related interruption during non-work hours, which impacts work-life balance and wellbeing. Meanwhile, we maintain that non-work role re-engagement (NWRR) moderates the relationship between work-related interruptions and work-life balance in non-work settings. An online survey among 336 U.S. workers provides partial evidence for the model and reveals that individual differences in boundary management ability such as NWRR, help employees take advantage of remote work flexibility and enhance work-life balance. Theoretical and practical implications were discussed.

Keywords: Boundary crossing; work-life balance; wellbeing; non-work role re-engagement (NWRR)

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Empoderamiento y autoconcepto: El rol de las universitarias en el liderazgo

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Resumen

En el contexto de las relaciones humanas, las oportunidades de compromiso son limitadas y distantes. Es, en este contexto, que la autopercepción adquiere gran importancia, sirviendo como filtro fundamental a través del cual, las mujeres universitarias, exploran sus identidades y metas, especialmente en lo que respecta al liderazgo. La teoría de la autopercepción propuesta por Daryl Bem ofrece una oportunidad para profundizar en el complejo proceso a través del cual los jóvenes líderes desarrollan sus propias percepciones y actitudes hacia el liderazgo, a menudo basadas en la observación cuidadosa de sus acciones y roles en entornos académicos y sociales.

La autopercepción juega un papel crucial como guía interna que influye significativamente en la toma de decisiones, las metas profesionales y la participación en funciones de liderazgo. Para las mujeres en el ámbito universitario, la autopercepción se convierte en un territorio delicado y formativo donde se entrelazan de manera compleja y multifacética las expectativas sociales, las normas de género y la autoevaluación, dando forma a sus vivencias e incluso a su empoderamiento. Este artículo destaca el profundo impacto que la autopercepción tiene en las actitudes hacia el liderazgo y la construcción de identidad en el entorno universitario.

En el contexto académico, las mujeres a menudo se enfrentan a desafíos sutiles pero persistentes en cuanto a cómo perciben sus propias capacidades de liderazgo. Surge la interrogante de cómo se ven estas mujeres como potenciales líderes en un entorno donde las concepciones tradicionales del liderazgo están fuertemente vinculadas a estereotipos masculinos arraigados en la sociedad. Además, ¿cómo influye la autopercepción en su disposición a asumir roles de liderazgo y desafiar las expectativas establecidas? Estas son cuestiones cruciales que se explorarán detalladamente, analizando las diversas formas en que las mujeres universitarias moldean su identidad de liderazgo a través del complejo prisma de la autopercepción.

Palabras clave: Autopercepción; desafíos; empoderamiento; liderazgo; universitarias

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Estudio de la mentalidad y liderazgo para influir en la productividad a través de la innovación empresarial

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Resumen

La nueva revolución de la industria 4.0 está impulsando una gran cantidad de discusiones e investigaciones para enfrentarla. La nueva gestión empresarial, atiende la adaptación de sus recursos a la cadena global de valor, ¿existe una forma de desarrollar un recurso que pueda enfrentar el rápido cambio? Para algunas organizaciones es prioridad crear nuevos empleos que combinen la tecnología y habilidades humanas. Sin embargo, deben formar un ejecutivo operador más especializado. Esta investigación trata de explicar cómo la influencia del liderazgo y la mentalidad aprendiente, tiene un efecto para influir en la productividad. La población de estudio, incluyó una muestra significativa de operadores de la industria maquiladora de transformación. Corroborar una habilidad fértil para la innovación, podría ser significativo para la formación de recursos humanos más adaptados a la nueva transformación.

Palabras clave: Industria 4.0; recursos humanos; mentalidad aprendiente; liderazgo; innovación

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La potabilización y costo del agua en Nuevo Laredo

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Resumen

De acuerdo con la sustentabilidad del recurso natural, el agua es vital en todos los centros poblacionales, así como para el crecimiento de la población. Cada vez se ha escaseado este vital líquido. Este elemental recurso se ha vuelto (el agua potable) necesario para la sustentabilidad humana y del entorno de la fauna y ecosistemas, por tal, es de vital importancia conocer el estado de disponibilidad y aprovechamiento con que se cuenta el vital líquido, con respecto a la demanda.

La Ing. Jazmín Mariscal encargada del departamento de cultura del agua, y el Ing. Luis de Anda Valades coordinador de operación de plantas del agua en la ciudad de Nuevo Laredo, con su apoyo al momento de visitar las instalaciones del Comité Municipal de Agua Potable y Alcantarillado (COMAPA), lo cual permite recolectar información relevante, así se pueden establecer criterios a considerar para el futuro cercano.

En este documento se puede apreciar la relevancia e importancia del cuidado del agua, tanto como el costo y proceso de potabilización del vital líquido. Expresando que es de suma importancia dar a conocer este tema, para su difusión en ambos Laredos, dado que compartimos la misma fuente natural de suministro de la cuenca Río Bravo para México, Río Grande para Estados Unidos de América (USA).

Palabras clave: Agua; potabilización; recurso

Water Purification and Cost in Nuevo Laredo

Abstract

According to the sustainability of the natural resources, water is vital in all population centers, as well as for population growth. This vital liquid has become increasingly scarce. This elemental resource has become (drinking water) necessary. For human sustainability and the environment of fauna and ecosystems, therefore, it is vitally important to know the state of availability and use of the vital liquid, with respect to demand.

Engineering Jazmin Mariscal in charge of the water culture department, and Engineering Luis de Anda Valades, coordinator of the water plant operations in city of Nuevo Laredo, with their support when visiting the facilities of the Municipal Drinking Water committee and sewerage COMAPA, which allows collecting relevant information, thus establishing criteria to consider for the near future.

In this document you can see the relevance and importance of caring for water, as well as the cost and process of purifying the vital liquid. Expressing that it is of utmost importance to make

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this topic know, for its dissemination in both Laredos, given that we share the same natural source of supply of the Rio Bravo basin for Mexico, Rio Grande for the United States of America (USA).

Keywords: Water; purification; resource

Boosting Competitiveness: The Role of Nearshoring in SMEs in the Auto Parts Sector in Nuevo Leon, Mexico

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Abstract

Despite numerous studies focusing on supplier development and the competitiveness of SMEs in both the automotive industry and other sectors, comprehensive research has yet to be conducted to analyze the impetus for the competitiveness of SMEs due to the nearshoring trend in Nuevo Leon, Mexico. Additionally, there needs to be more information regarding the effects on SMEs in Nuevo Leon's automotive parts sector. This research aims to analyze the drive generated by nearshoring in companies within the automotive parts sector in Nuevo Leon and its effects on decent work. This will be carried out through a literature review and an analysis of various semi-structured interviews with experts in the field, aimed at gathering valuable insights from individuals who have had direct and indirect involvement in the current situation in Mexico and Nuevo Leon. The qualitative analysis allowed for a detailed examination of the various effects resulting from the implementation of the USMCA and nearshoring on competitiveness and decent employment in SMEs. The findings revealed different positive effects driving the competitiveness of SMEs, as well as areas of opportunity for the better development of SMEs in Nuevo Leon's automotive parts sector.

Keywords: Nearshoring; competitiveness; investment; SMEs; USMCA; internationalization; auto parts; Nuevo Leon; Mexico

I. Introduction

There has been a radical change in business dynamics in recent years due to globalization and the increasing interconnectedness in international markets. Because of that, small and medium enterprises, in this context, play a crucial role in the economy, particularly in regions like Nuevo Leon, Mexico, where the automotive parts sector is of vital importance. Competitiveness in this sector has become an increasingly pressing challenge, driving the need to explore innovative

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strategies that enable Small and Medium Enterprises (SME) to maintain and strengthen their position in the global market.

The present research delves into one of these emerging strategies: nearshoring. This approach seeks geographical and cultural proximity to key markets, in contrast to the traditional global outsourcing trend. In this context, the state of Nuevo Leon, with its strategic location and significant presence in the automotive industry, becomes an ideal laboratory to examine how nearshoring can enhance the competitiveness of SMEs in the auto parts sector.

This research aims to thoroughly analyze the impact of nearshoring on SMEs in the auto parts sector in Nuevo Leon, exploring its benefits, challenges, and opportunities. An interdisciplinary approach that combines economic, business, and social elements seeks to shed light on how companies can leverage this strategy to improve their position in a highly competitive and globalized market.

In the following study, we will examine the theoretical background of nearshoring, the characteristics of the auto parts sector in Nuevo Leon, and the obstacles and prospects of this trend. Ultimately, this research aims to contribute to both academic and business knowledge by providing valuable information for SMEs and stakeholders in the auto parts sector in Nuevo Leon, helping them make informed and strategic decisions in an ever-evolving business environment.

Finally, the research question focuses on the following: How will relocation of companies (nearshoring) enhance the competitiveness of SMEs in the auto parts sector in Nuevo Leon from the perspective of the USMCA (United States-Mexico-Canada Agreement)?

II. Literature Review

Nearshoring is an outsourcing strategy that involves relocating business operations or production processes to a nearby country or the same geographic region instead of to more distant locations or outside the area (Economista, 2022). This strategy focuses on leveraging the destination location's cost advantages and geographic proximity to realize benefits such as lower wages, reduced operating costs, lower transportation expenses, and greater flexibility in supply chain management. In short, nearshoring seeks to establish itself where all fees, costs, and even taxes are cheaper.

Mexico is an attractive destination for nearshoring given its geographical proximity to the United States, which is its leading trading partner since they share an extensive land border of 3,152 kilometers with the United States, facilitating transportation and logistics, which reduces costs and delivery times (CLAUT, 2023).

In the same way, according to reports, the Agreement between Mexico, the United States, and Canada (USMCA), known before as the North American Free Agreement directly impacts the choice of Mexico over other destinations in terms of nearshoring within the automotive sector (Pineda, 2022). Since free trade agreements eliminate or reduce tariffs and facilitate trade between the three countries, Mexico is an attractive place to establish nearshoring operations, as it provides access to a large market and allows products to be exported more efficiently. A positive example of this could be a machining company that obtained nine new clients after the implementation of the T-MEC, which represented 1 million dollars in sales.

Likewise, time compatibility plays a vital role since Mexico's time zone is similar to that of much of the United States, which facilitates coordination and communication between companies in both countries, which is crucial in nearshoring operations, where synchronization and effective collaboration are essential (Gobierno de México, 2022).

Furthermore, the competitive costs are highlighted, not only because labor costs in Mexico are lower than in the United States but also because the quality of the labor is high, making production operations profitable without compromising product quality. Likewise, Mexico offers access to the United States and provides a platform to reach other markets in Latin America and the world. This makes it an attractive hub for companies expanding their global operations and sales.

The reasons above show that nearshoring greatly influences the internationalization of small and medium-sized businesses (SMEs). Mainly because they are offered the expansion of activities

and the high demand given the relocation of foreign companies in search of suppliers and all types of operators in the supply chain. This allows SMEs to access international markets more effectively by establishing operations or business partners in nearby countries. Nearshoring can even promote the transfer of knowledge and technology at the local level, which can foster capacity development in recipient countries and strengthen long-term business relationships (Clúster Industrial, 2023).

Figure 1. USA and Mexico PowerPoint Map, Editable States.



Source: <http://tinyurl.com/42jf66au>

Nuevo Leon has built a series of competitive advantages that make it attractive for nearshoring investments, particularly for SMEs. The strategic location, skilled labor, and advanced industrial infrastructure are key factors that drive the region's success in this phenomenon. Furthermore, the Camara de la Industria de Transformacion de Nuevo León (CAINTRA) and other local business organizations promote collaboration between local and foreign companies, which creates a favorable business environment for SMEs seeking to settle in the region (Clúster Industrial, 2023).

On the other hand, the Cluster Automotriz en Nuevo Leon, A.C. (CLAUT) is an organization composed of leading automotive manufacturers and academic and governmental institutions associated with this field. Its primary mission is to enhance the competitiveness and development of the automotive sector in the region through collaboration, partnerships, and synergies among government, academia, and industry. CLAUT encompasses vehicle assembly companies, first, second, and third-level suppliers, commonly referred to as "Tier 1," "Tier 2," and "Tier 3" suppliers, as well as support companies for the automotive industry, such as logistics and consulting

services. The Tier 2 segment comprises small and medium-sized enterprises (SMEs) specializing in automotive parts (CLAUT, 2023).

It is important to understand that and in the automotive industry, the suppliers are normally organized in “tiers”. In a modern supply chain like the ones used in the automotive industry, suppliers are organized in sequential levels called tiers. The original equipment manufacture (OEM), for example Nissan or Honda, relies on Tier 1 (module and system suppliers), Tier 2 (component manufactures) and Tier 3 (parts suppliers). The manufactures of Tier 2 tend to be smaller than the Tier 1 companies but are indispensable for the creation of specialized components (Walterpack, 2023).

A report from 2023 mentions that 78 Tier 2 companies are within the Cluster (Cluster Industrial, 2023). Tier 2's primary objective is to foster the competitiveness and growth of its affiliated companies through collaboration, partnerships, and synergies with government, academia, and other businesses. Critical projects for Tier 2 companies include generating business opportunities with OEMs and Tier 1 suppliers, participating in best practices training programs, gaining access to government funds and bank credits, and engaging in trade missions (CLAUT, 2023).

Correspondently, three years after the implementation of the United States-Mexico-Canada Agreement (USMCA), exports reached \$89,224 million, with the primary market being the United States at 87.9%. Imports of automotive parts, primarily components, amounted to \$60,717 million, mainly sourced from Asia. Therefore, the current goal of the automotive industry is to reduce imports from Asia by almost 30% to allow Tier 2 and SMEs to capitalize on component production (Cluster Industrial, 2023).

Additionally, each year, the Automotive Supplier event takes place, featuring business meetings, conferences, and exhibitions to identify new opportunities for Tier 2 companies with potential future clients (Proveedor Automotriz, 2023). In 2022, more than 250 supplier companies, over 47 buying companies, and an estimated 700 business meetings were confirmed, with a demand for over 380 different components and automotive parts from Tier 1 and OEM companies (Pineda, 2022).

In addition to that, the USMCA facilitates internationalization in different forms for Mexican SMEs on its chapter 25 titled “Small and Medium Enterprises” (Secretariat of Economy, 2020). This chapter states that the Parties (USA, Mexico and Canada) need to cooperate in order to promote jobs and the growth of SMEs (Congress, 2020). Before the USMCA came into effect, Tier 1 manufacturers and automotive companies imported over 80% of their components compared to regional content, as it was more convenient and cost-effective. This is the primary reason for Mexico's significant shortage of Tier 2 companies. Although there are around 600 Tier 1 and Tier 2 companies in Mexico, there should be a substantially higher number of Tier 2 companies, an estimated 2,500 (CLAUT, 2022).

However, there is a high demand for automotive parts from Tier 1 and OEM companies. Still, local Tier 2 companies do not provide an adequate supply, prompting these companies to seek foreign suppliers to meet their needs. Therefore, there is an urgent need to increase supply by boosting the production of existing companies, establishing new enterprises, and exploring companies in other industries that can meet specific requirements (CLAUT, 2022).

It is crucial that companies must be aware of the current situation and invest to become attractive to Tier 1 and OEM companies despite high interest rates. This will enable them to improve long-term productivity and position themselves at higher levels (Cluster Industrial, 2023).

Additionally, an analysis conducted by CLAUT involving 247 companies, during the “Automotive Supplier 2022 Edition”, it was found that the shortage of Tier 2 companies in the industry is mainly due to a lack of certifications and insufficient installed capacity. Tier 2 companies typically hold ISO 9000 and IATF 16949 certifications, but only a limited number possess these and other certifications that could expand their customer base (Mexico Industry, 2023).

To address this issue, CLAUT, in collaboration with the Ministry of Economy and the Directorate of Productive Chains, is promoting training programs to ensure that 100% of Nuevo Leon's companies obtain the necessary certifications to integrate into the supply chains of OEMs

and Tier 1 companies. Four critical processes, identified by some significant companies within the cluster, have been selected for this purpose: cold forging, high-pressure aluminum injection, steel casting, and gravity aluminum casting (CLAUT, 2022). Additionally, SMES must prepare for IATF 16949 certification to earn the trust of Tier 1 and OEM companies (Coronado, 2023).

Experts emphasize that while technically, SMEs can become suppliers, they need to continue growing at the same pace as new investments (Montoya, 2020). As a result, investment funds are interested in participating in the industry and supporting Tier 2 companies. Therefore, it is essential to focus on developing local suppliers in Nuevo Leon or exploring potential suppliers in other industries that can contribute to the automotive sector (Coronado, 2023).

In the automotive industry, there are notable challenges, particularly in meeting globalized standards aimed at fostering a sustainable planet. The United Nations responded to these challenges by formulating the Sustainable Development Goals (SDGs), which serve as a universal imperative for societal transformation amidst pressing issues like poverty, climate change, social injustice, and rapid urbanization. Central to this agenda is the imperative for companies to integrate the 17 SDGs into their operations, ensuring progress toward peace and prosperity for all by 2030 (UNDP, 2015). This imperative extends to sectors such as the automotive industry and auto parts manufacturing.

On the other hand, the International Organization of Motor Vehicle Manufacturers (OICA) mentions that the automotive industry is the most significant engine of economic growth globally. It is a crucial factor in the economy of many countries worldwide, and it has registered a 30% increase over the past decade (1995-2005) (OICA, 2023).

To visualize its impact, building 60 million vehicles requires about 9 million directly in the making and creating the parts and the cars themselves, so its impact falls upon the economic growth and employment of millions of people worldwide (OICA, 2023). With this in mind, the automotive industry has to implement the agenda proposed by the U.N. to promote sustainability and a better lifestyle for our society. In the following research, we will study the growth of the automotive industry in northern Mexico and the measures it should follow under the Social Development Goals (SGSs).

For instance, the automotive industry is the best prospect industry sector for Mexico. It is a significant market for U.S. passenger vehicles, trucks, buses, auto parts, and supplies, so this industry provides economic growth advantages and direct foreign investment, so it is a significant employer around Mexico. This impact comes with great responsibilities that Mexico must follow, such as the United States-Mexico-Canada Agreement USMCA and the SDGs (The International Trade Administration, 2023).

To meet the goals of Agenda 2030, the SDGs come together to tackle different problems. SDG 8 "Decent Work and Economic Growth," considers the need for a safe work environment for humanity and links the need for creating new forms of work, social dialogue, and access to social protection (Kreinin & Aigner, 2022).

Therefore, defining what constitutes decent work is crucial to understanding the relevance of this SDG. The International Labour Organization (ILO) considers decent work to encompass various facets of individuals' working lives, including employment, social protection, workers' rights, and social dialogue. This definition extends beyond safeguarding formal economy workers to include unregulated wage workers, the self-employed, and home workers. Crucially, the concept was formulated by the ILO's tripartite constituency, comprising governments, employers, and unions (Ghai, 2003).

Considering this perspective, experts argue that nearshoring has had a positive impact on Mexican SMEs by providing them with access to international markets and enhancing their competitiveness (Martinez, 2023). Consequently, this has led to the creation of new jobs through increased productivity (Garrido, 2022). Mexico's significant inflow of foreign direct investment, ranking among the top 10 countries globally, underscores the growing reality of nearshoring in the country, highlighting the competitiveness of the Mexican labor force (Secretariat of Economy, 2023). Therefore, it is crucial to recognize the challenges that may arise in ensuring that nearshoring practices align with globally standardized standards, particularly regarding labor conditions and sustainability.

Additionally, the automotive industry has faced significant challenges, in recent years, that have substantially impacted its sales. These challenges include the arrival of COVID-19, trade wars, and tensions between the United States and China. One of the main issues that has arisen is the emergence of bottlenecks in the supply chain.

The supply chain issues have had a substantial impact on the automotive industry. Car manufacturers have experienced a decline in their profit margins, particularly in the mass-market segment, due to difficulties in entirely passing on the increased costs of connectivity, electrification, and autonomous driving (as reported in "Sharing Insights Elevates Their Impact" 2020). Also, problems have arisen with orders already placed and products in progress that could not be delivered. There have also been disruptions in maritime shipments due to port closures, inventory shortages in various auto parts companies, notable losses in sales and purchasing power, and the breakdown of partnerships with manufacturers located far from the production companies, as was the case with China.

Therefore, nearshoring is growing in popularity as a viable alternative. More and more companies and factories have begun to adopt it in response to the need for a safe and efficient supply chain (Fonseca & Da Rocha, 2021). Consequently, this series of events has raised greater awareness among companies, executives, workers, and other stakeholders about the importance of the location of manufacturing plants and their relationship with the automotive market in which they operate.

The nearshoring approach has become increasingly popular in countries such as the United States, Mexico, Canada, and Germany, among others. A study shows that 33% of companies are moving or planning to move their manufacturing activities out of China in the next three years (Cortiñas, Schechter, 2021). This reflects how the nearshoring strategy is being adopted in various regions as an effective way to strengthen their positions in the global market, reduce commercial risks, and diversify their supply chains to achieve more efficient and profitable production. Furthermore, this trend demonstrates how countries seize this opportunity to enhance their business models and bolster their economies (Perez, 2021).

III. Methodology

We conduct a qualitative research with a descriptive-explorative focus. This election is justified by the need to recollect firsthand information and its many points of view, allowing a thorough and comprehensive analysis of the topic. It is stated that exploratory studies are followed when there's little information and research about a specific topic, or it has yet to be studied (Alesina, 2020).

Additionally, an inductive method will be conducted, seeing that an interpretation of various observations and particular experiences of the theme is being followed (Palmero, 2020). The main instrument utilized to gather relevant information consists of secondary sources, encompassing various studies and analyses related to the phenomenon of nearshoring, the automotive and auto part industry, the USMCA, small and medium enterprises involved in the industry, the SDGs in the auto part sector, the internationalization of SMEs and national and international organizations and institutions relevant to the topic.

The literature review was carried out by consulting various sources obtained from the University of Monterrey's digital library and scientific papers from Google Scholar. The national and international organizations cited previously include the Institute of National Statistics and Geography (INEGI), the Automotive Cluster of Nuevo Leon (CLAUT), the Government of Mexico, United Nations Development Program (UNDP), Secretariat of Economy (Mexico), International Organization of Motor Vehicle Manufacturers (OICA) and other sources that played a crucial role in obtaining relevant and current data.

In addition, the second instrument of recollection, is the performance of semi-structured interviews of informants, very well positioned in the auto part industry, who possess profound knowledge of the topic of nearshoring and have provided valuable perspectives on the matter. One interview was conducted with Guillermo Malpica Soto, the former Head of the Commercial and NAFTA Office of Mexico in Washington, D.C. Another interview was conducted with Miguel

Bravo, the current Commercial Manager of CLAUT, the Automotive Cluster of Nuevo Leon. CLAUT is an organization dedicated to advancing the competitiveness and growth of the automotive sector in the region, constituting its primary mission.

IV. Results

The informants agreed that the strategic location of Nuevo Leon has a significant influence on companies since this region is close to the border, and the Laredo (USA)-Colombia (Mexico) Solidarity Bridge brings advantages to efficient supply management.

Some other noteworthy factors include the advanced industrial development in Nuevo Leon, which enables companies to procure local supplies. It is also crucial to highlight that other significant factors have involved the disruption of supply chains in recent years due to global situations, such as the pandemic and the recent tightening of regulations imposed by the USMCA treaty, which includes the increase from 66% to 75% in regional content.

Both perspectives show that the USMCA and its changes have attracted second-level suppliers to the Nuevo Leon region. Therefore, international TIER 1 companies invite TIER 2 companies to install in the USMCA region. Thus, Mexico becoming more attractive for companies to settle down in the region, adding to the nearshoring phenomenon.

Although both informants endorsed that small and medium-sized enterprises have a great opportunity if they establish themselves in Nuevo Leon because of the region, one does add that the opportunity is there but not instantaneously because of the strict regulation the automotive sector has. There are requirements needed to become a supplier in the automotive industry, one of them being certifications. That limits the possibilities for SMEs since not many of them could get them.

Taking this into account, the simple fact that there is a lot of foreign direct investment promotes economic contribution not only through suppliers in the second and third levels but also through indirect suppliers and service providers. This reaction boosts the opportunity for many SMEs.

In the USMCA treaty, the chapter XXV was explicitly negotiated for Small and Medium-sized Enterprises (SMEs), marking the second instance where Mexico, in all its treaties, has dedicated a specific chapter to SMEs. One of its primary objectives is to foster collaboration between large and small enterprises across the three countries, aiming to enhance the prospects of SMEs in the export market. While the chapter reflects positive intentions and serves as a starting platform for collaborative efforts between both enterprises, it currently lacks enforceable obligations.

Typically, established companies already have competitive and standardized processes, so collaboration with SMEs occurs more organically rather than creating a significant impact on the supply chains of large enterprises.

The Secretary of Economy at both the municipal (Monterrey) and state levels has various programs to promote the integration of supply chains and foster the growth of SMEs. For instance, the launch of the Supply Hub by the Productive Chains Directorate serves as a multisectoral linkage platform, allowing leading companies to submit their requirements while enabling SMEs to offer their RFQs quickly and seamlessly. The Clusters Directorate has allocated 50 million pesos in the past year to encourage import substitution through SMEs. The Productive Chains Directorate recently called 35 SMEs to join international markets through training, diagnostics, and personalized advisory services, with 90% of the cost being covered.

It is crucial to identify and cultivate companies from various industries that have the potential to migrate processes and manufacture products for the automotive sector. The initial steps involve assessing existing production capacities, evaluating the feasibility of converting certain sectors to serve the automotive industry, addressing specific certifications, and ultimately fostering partnerships between companies. The significant role played by the existing clusters in Nuevo Leon becomes crucial in facilitating synergy among businesses for collaborative efforts. There is a need to proactively develop strategies to capitalize on emerging opportunities aligned with the nearshoring trend.

There are challenges, like the standard of quality in the automotive sector is extremely high, so the first constraint SMEs can face are the certifications needed to become a supplier in the automotive industry, like the IATF16946 certification, which is mandatory, and to achieve it, a large amount of money, resources and time is needed. The company must also have great quality products that match the competition and a constant production rhythm, which could be difficult for a small enterprise with irregular cycles.

The CLAUT supports SMEs in seamlessly integrating into Industry 4.0, aiming to enhance their efficiency and quality in processes. This is particularly crucial given the substantial volumes within the industry and the increasingly limited availability of human resources, which are becoming progressively more strategic.

Lastly, Mexico has a great labor force because of its cost structure and disponibility, compared to the U.S. or Canada, which have higher paying salaries, making them not the first option and transforming Mexico into the first choice.

The effects nearshoring has on employment are mostly positive but challenging. If a company from another country establishes itself in Mexico, initially, it may bring a percentage of workers or executives from that country. However, over time, it will strive to develop a local workforce, if available, to reduce reliance on expatriates. Opportunities arise but are not automatic; they heavily depend on Nuevo Leon's workforce competitiveness. Developing specific competencies to compete in the automotive market, which is transitioning to electric vehicles, is crucial. If these competencies are successfully cultivated, it will have a positive impact not only on employment but also on wages. Traditionally, it has been studied that export-oriented sectors in Mexico, on average, pay 40% more than jobs in non-exporting sectors.

Also, it was found that a challenge of nearshoring is the need for skilled labor. In Mexico, it is estimated that nearly 2 million people work at some level within the automotive parts sector, representing almost 60% of employment in North America, with a projected growth rate of nearly 2% by 2024.

V. Discussion

The results confirm that Mexico's proximity to the United States is a critical factor that makes it attractive for nearshoring. This country provides economic advantages, such as cost reduction due to ease of transportation and logistics, and the benefits of the free trade agreement shared with the United States and Canada.

Similarly, a factor of utmost importance, though not mentioned by the informants, is that Mexico and the United States share a similar time zone, unlike Mexico and Europe. This facilitates better coordination and communication for all business operations, an aspect that is not always acknowledged but contributes significantly to the success of collaborative activities.

The opportunity to establish operations in this state is evident within the competitive advantages for small and medium-sized enterprises in the automotive parts sector when establishing themselves in Nuevo León, as indicated by the conducted interviews. However, a challenge persists concerning certifications, which slows down the process. This aspect poses a difficulty, as obtaining an international certification from a third-party organization is essential to demonstrate compliance with the requirements for provisioning in the automotive sector by the IAFT 16949 regulation and the IATF16946 certification.

The United States-Mexico-Canada Agreement (USMCA) plays a significant role in nearshoring in Mexico. Its positive influence is notable because it establishes low tariff rates, yielding various benefits. These include boosting the country of origin's supply, economic advantages related to raw materials used in production, exclusivity, and lower logistical costs (PwC, 2023).

Similarly, institutional trade barriers have been reduced through the USMCA, resulting in the benefit of facilitating the transit of products among member countries. Companies contacted by the Bank of Mexico revealed that, within 2022, there has been a noticeable increase in the arrival of foreign organizations to Mexico. These companies express a clear interest in capitalizing on the proximity to the United States and the rules of origin, especially when compared, for example, to the trade relationship between China and the United States, where the benefits above were

absent. It was found that a significant percentage, 49% of the surveyed companies, commented that one of the main reasons why more businesses have chosen Mexico for the implementation of nearshoring is due to the rules of origin established by the USMCA.

The synergistic collaboration between local and international companies in the automotive parts sector within Nuevo Leon has evolved due to numerous companies establishing their presence in the region. The rationale behind global companies forging commercial ties with local entities stems from a series of supply chain challenges experienced on a worldwide scale in recent years, primarily attributed to the impacts of the pandemic and geopolitical conflicts. In response to these challenges, corporations opted to establish operations near their end customers, leveraging the inherent advantages that ensue. This strategic proximity enables swift responsiveness to unforeseen events, mitigates challenges associated with long-distance transportation, and capitalizes on the benefits derived from the proximity of suppliers to key consumer markets. Furthermore, this collaborative approach provides additional advantages, including diminished logistics costs, expedited and secure supply chains, access to a skilled labor pool, and favorable considerations about taxation and tariffs.

A potential transformative and enhancing impact on the automotive sector resulting from the USMCA and the trend of nearshoring involves the assessment of prospective suppliers within the current automotive industry and across other sectors capable of adapting to become participants in the automotive industry. As emphasized by CLAUT in Nuevo Leon, there is a critical need to concentrate on developing local suppliers and, when necessary, actively seek out potential contributors to the automotive industry. This strategic approach aims to attract new investments and bolster the competitiveness of SMEs continually.

There is support from the government and the industrial clusters to make the companies more competitive. There are different types of support, such as governmental programs dedicated to advancing the integration of supply chains and nurturing the expansion of Small and Medium-sized Enterprises (SMEs). A notable initiative in this regard is the introduction of the Supply Hub by the Productive Chains Directorate, which functions as a versatile multisectoral linkage platform. The Productive Chains Directorate recently called 35 SMEs to embark on international ventures, offering comprehensive support encompassing training, diagnostics, and personalized advisory services, with an impressive 90% coverage of associated costs. This is what gives the CLAUT to the SMEs: participation in best practices training programs, access to government funds and bank credits, and involvement in strategically aligned trade missions. These proactive measures underscore a dedicated commitment to fostering SMEs' prosperity and global competitiveness within the region. The CLAUT is also helping to implement new technology and integrate it into the industry to produce more efficiency and quality in its processes and products.

The nearshoring has positively impacted employment in the automotive parts sector in Nuevo Leon, Mexico. As companies from other countries establish themselves in Nuevo Leon, they create new jobs for both skilled and unskilled workers. These jobs are primarily in manufacturing, engineering, and logistics. Nearshoring is also having a positive impact on economic development in Nuevo Leon. The influx of new companies and the creation of new jobs are leading to increased economic activity and growth. Nuevo Leon has received billions in investment in the span of two years. These investments are helping to modernize the automotive parts sector and make Nuevo Leon a more competitive player in the global market. In addition, nearshoring is also helping to attract new talent to Nuevo Leon. As the automotive parts sector grows, there is a growing demand for skilled workers. This attracts young people from other parts of Mexico to Nuevo Leon, where they find good jobs and opportunities for advancement.

While nearshoring presents a number of opportunities for Nuevo Leon's automotive parts sector, some challenges need to be addressed. One challenge is the need for a skilled workforce. As the automotive sector transitions to electric vehicles, there is a growing demand for workers with specialized skills. Nuevo Leon needs to invest in education and training initiatives to ensure the proficiency of its workforce to compete in the global market. Another challenge is the need to improve infrastructure. Nuevo Leon needs to invest in its transportation and logistics infrastructure to ensure that it can efficiently support the automotive parts sector.

Regarding the effect on the creation and increase of decent work in SMEs in the automotive parts sector, both the literature and the results agree that nearshoring has had a positive impact, especially concerning competitiveness and productivity. Nearshoring has generated new jobs, improved productivity, and increased the competitiveness of Mexican SMEs. This is related to the data obtained in the interviews, being the most relevant in this regard, confirming the industry's impact within North America, representing 60% of employment in the region.

Likewise, the challenges and opportunities of nearshoring for the industry are highlighted. Although the results indicate that the Mexican challenge focuses on qualified labor, the opportunity to access international markets and technological resources to nearshoring.

VI. Conclusion

The following study analyzed the opportunity of nearshoring on Small and Medium Enterprises (SMEs) in the auto parts sector in Nuevo Leon, Mexico, and found how this strategy enhances competitiveness under the United States-Mexico-Canada Agreement (USMCA). It underscores the changing dynamics in global business due to globalization and the interconnectedness of international markets, emphasizing the crucial role played by SMEs in Nuevo Leon's automotive sector.

The study delves into the auto parts sector in Nuevo Leon, focusing on Tier 2 SMEs affiliated with the Cluster Automotriz in Nuevo León (CLAUT). The analysis reveals challenges these SMEs face, such as a shortage of certifications and insufficient capacity, impacting their ability to meet the demand from Tier 1 and OEM companies. Efforts are underway to address these challenges, including training programs and initiatives to enhance certifications and capacity. The effects of nearshoring on SMEs in the auto parts sector are evaluated through the lens of the eighth SDG. The analysis aligns with existing literature, indicating that nearshoring positively impacts SMEs by improving productivity, generating new jobs, and enhancing competitiveness. The nearshoring strategy allows SMEs to access international markets and resources, contributing to their growth and sustainability.

Limitations

The study underscores the automotive industry's challenges, such as supply chain disruptions, and highlights nearshoring as a viable solution. The proximity of suppliers to major consumer markets reduced logistics costs, and access to qualified labor are cited as benefits of nearshoring in the automotive parts sector. In summary, the research contributes valuable insights into how nearshoring impacts SMEs in the auto parts sector in Nuevo Leon, shedding light on the benefits, challenges, and opportunities. The findings provide a basis for informed decision-making by SMEs and stakeholders in the rapidly evolving and globalized business environment.

To enhance future studies, it would be advisable to broaden the sample through a more significant number and diversity of interviews with local businesses, the state's economic department, and organizations supporting established and emerging investments. Including local businesses would allow for a more comprehensive comparative analysis, offering a broader perspective on the effects they are experiencing and how they are driving their competitiveness. Additionally, supplementing quantitative data could enhance the analysis and provide a more robust foundation for drawing well-founded conclusions. Forecasting the long-term impact of nearshoring on SMEs in the automotive parts sector in Nuevo Leon, considering aspects such as local economic development, job creation, and social factors, would also contribute to a more thorough understanding.

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Product Market Competitive Threats and Firm Value: The Moderating Role of R&D Capability

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Abstract

Studies on the adverse effects of product market competition (PMC) on firm value often need to appreciate how to overcome them. Our study aims to explore the mechanism of how the R&D capability works as a tool to reduce the negative impacts of PMC on firm value. Drawing from the resource-based view (RBV) and the industrial organization (I.O.) theory, we argue that PMC helps firms alter the characteristics of R&D capability: value, rarity, inimitableness, and organization (VRIO), and their ability to generate sustainable competitive advantage (SCA), which ultimately impacts firm value. We tested our hypotheses using a panel data set (n=64,147 firm-year observations) of publicly traded US firms from 1990-2021. The study results supported our hypothesis that R&D capability mitigates the negative impact of PMC and enhances firm value.

Keywords: R&D capability; product market competition; HH index; fluidity index; similarity index; firm value

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Development of a Web-Based Timetabling Software for a Mexican University

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Abstract

This article shows the significant progress of a technology project that is currently being developed at the Universidad del Noreste in Tampico, Tamaulipas, Mexico. In the near future, the project will generate automatic and intelligent schedule planning through algorithms specialized in resource management in the area of Engineering and Chemical Sciences of said university.

As of the date this document, the system allows teachers responsible for carrying out the work of scheduling schedules to do so in an intuitive and practical way through a web application. The system allows professors to enter their work schedule preferences such as available days and hours and considers the university's requirements regarding working hours for each professor, it also considers various restrictions, for example the subjects (course) that can be taught. each teacher, schedules defined by the language area and programmed for students, availability of classrooms, etc. The manual management that was done until a few months ago produced many errors and conflicts in academic programming, affecting both the administration and to the academy, since many man-hours were invested in this process, which, because it was not automated, had many weaknesses.

The web application created makes it easy to find viable schedule scheduling solutions that satisfy the requirements and restrictions. It has also been prepared so that, when integrated with intelligent algorithms, it can propose optimal and efficient solutions in scheduling the generation of schedules.

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I. Introduction

Efficient scheduling in academic institutions is crucial to ensure optimal utilization of resources, meet the diverse needs of students, and facilitate the smooth functioning of educational programs. However, manual scheduling processes are often arduous and error-prone, particularly at large institutions with complex restrictions and preferences.

From the engineering point of view, the problem is traditionally solved through combinatorial optimization with operations research techniques and/or heuristic algorithms [1-3]. In the last two decades, metaheuristic algorithms have provided advances and improvements in the quality of the solution but at a much higher computational cost [2], [4-7], with the advancement and development of the various branches of artificial intelligence, machine learning and genetic algorithms have emerged to give very effective results in this type of problem [8]. Recent publications have made an exhaustive review of the various methodologies and recent contributions reported for timetable design in school environments [9-10]. Without a doubt, there is currently a growing interest in taking advantage of computational methods to automate the generation of academic schedules, with the aim of streamlining the scheduling process and improving overall efficiency.

Automated scheduling systems harness the power of computational algorithms to generate schedules that adhere to various constraints and objectives, such as room availability, faculty preferences, student course selections, and curriculum requirements. These systems offer the promise of reducing the time and effort invested in scheduling tasks while producing schedules that are optimized for key metrics such as minimizing conflicts and maximizing resource utilization.

This research endeavors to contribute to the burgeoning field of automated academic scheduling by presenting a comprehensive study of a software project dedicated to this endeavor. Our software project aims to develop a robust and flexible scheduling solution tailored to the specific needs of Universidad del Noreste in Tampico, Tamaulipas, Mexico.

1.1 Motivation

This project addresses the problem of manual schedule timetable planning in the Engineering area of the Universidad del Noreste in Tampico, Tamaulipas, Mexico. The current manual management is carried out by obtaining information from many sources (mainly excel spreadsheet files) and without order -Fig. 1-, the director of the engineering area and a support teacher oversee collecting all the information to plan almost manually and obtain feasible timetable schedules of the engineering careers in each academic period. The above leads to errors and conflicts in academic programming, affecting both the administration and the experience of teachers and students, in addition to the large investment in man-hours invested in this tedious work.

The proposal for the university consisted of developing a system with well-defined roles -Fig. 2- and an intuitive user interface for an automated system for generating academic schedules. The global project will be developed in three stages. This document shows the results of the first stage. The objective of the project development is to automate the processes in the work of academics in addition to optimizing the allocation of courses, classrooms and all resources involved, reducing conflicts and maximizing efficiency.

1.2 Expanded Project Vision

The project is planned for three stages, the first is documented in this article, it represents the backbone of the software, it allows planning the schedules of the school periods of the engineering careers of the university in an easy, friendly way and with an intuitive interface. university. The second stage is planned to integrate with operations research methods or heuristic or metaheuristic algorithms. The third stage would consist of integrating machine learning so that the system could learn to schedule school schedules more efficiently.

Figure 1: Planning timetables Universidad del Noreste (previous situation).

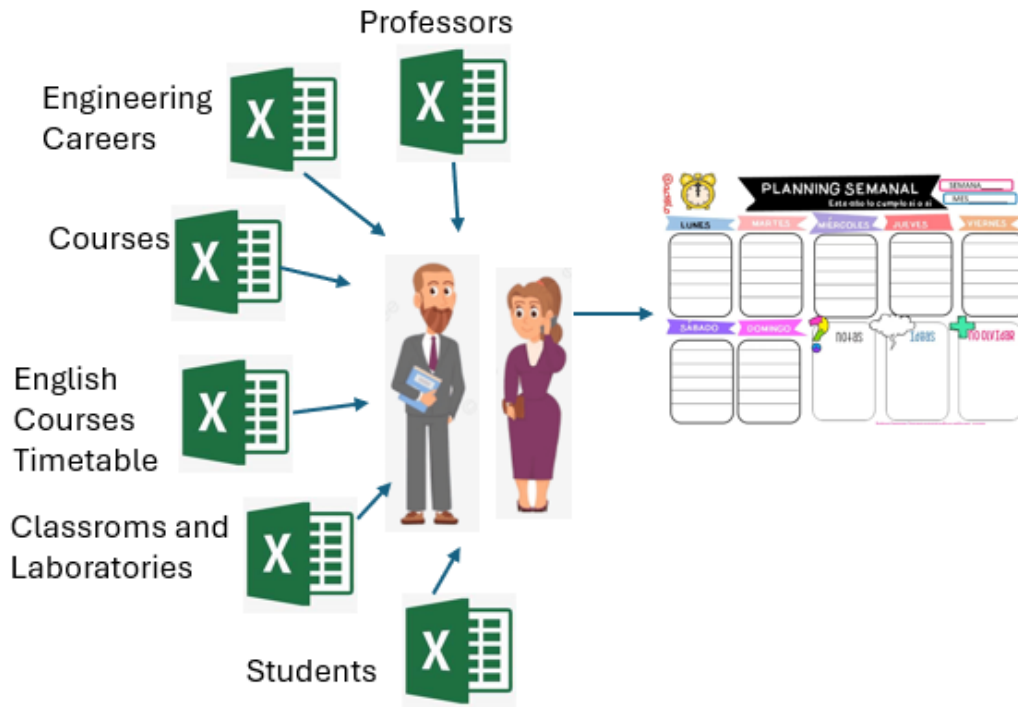


Figure 2: Roles and responsibilities for the system (first stage).

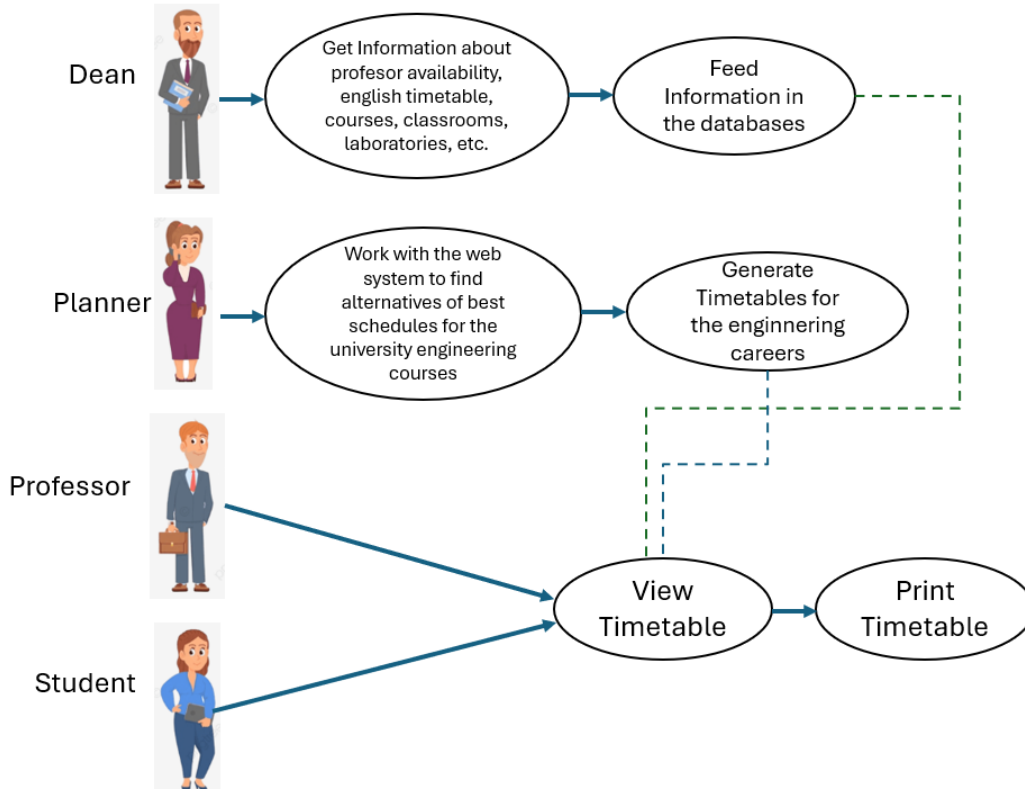
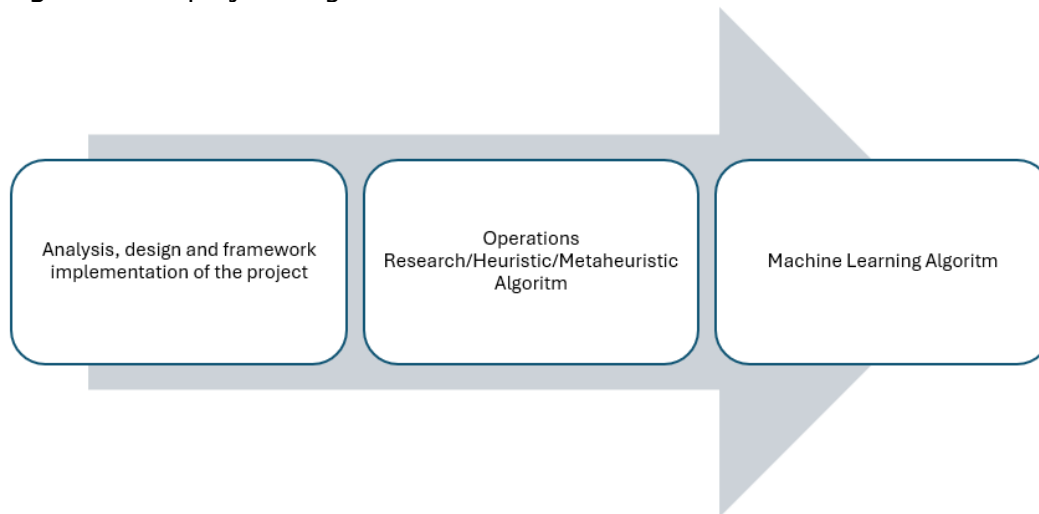


Figure 3: Full project stages.



1.3 Outline of the Remaining Sections

In the next sections we review the existing literature on automated scheduling algorithms and highlight the challenges and opportunities in applying these techniques to academic scheduling contexts; then it is presented the methodology employed in the development of the software project, including the analysis, design, frontend and backend development, and it is described the implementation details of the software, outlining its architecture, functionalities, and user interface components.

II. Literature Review

A summary of the most relevant projects related to this article is shown in Table 1 [11-16], the main characteristics of the implementations are described there. Only the web based, or applications of timetable educational system are shown since they are somehow similar to the work described in this paper.

There are several methodologies which have been proposed for the development of the timetable system, depending on various parameters and requirements. Most of the researchers used metaheuristics or machine learning techniques for optimization. However, each proposal is for a specific academic institution and addresses different problems with diverse constraints. Furthermore, industry base solutions are expensive and charge huge licensing costs yearly. Therefore, in this paper, it is presented the web base platform to develop an efficient timetable system with an attractive Graphical User Interface (GUI) which reflects and solves our institution problems and issues. The design of the platform described has been carefully and meticulously decided so that any future changes or restrictions can be integrated without major problems.

III. Methodology

3.1 Analysis

The analysis information was carried out with the personnel involved in timetable planning of the engineering area of the university. The most relevant information presented in this part of the system development is shown in this section.

Table 1: Implementations of timetable educational applications reported.

Author/Year	Title of the Article	Summary
Ong Boon Chun (2020)	Web-Based Scheduling Software for a University	This thesis provides insight into the process of creating the scheduling system, including the connection to the database, the design of a backtracking algorithm and a genetic algorithm.
Florent Devin, Yannick Le Nir (NA)	On-line Timetabling Software	The paper discusses the challenges of timetabling and presents a software solution that addresses data acquisition and timetable computation. The software uses advanced technologies, such as Rich Internet Application and constraint programming in swi-prolog, to automate the timetabling process. The use of web services allows for interaction with Google Calendar and the software is built in the IT system. The paper also includes a real case study to demonstrate the effectiveness of the software.
R.D.P.I. Priyadarshana (2021)	Web Based Timetable Management System for University of Vocational Technology	This dissertation presents a Web Based Timetable Management System for UNIVOTEC in Sri Lanka. The manual process of managing the university timetable is time-consuming and prone to errors. The system aims to automate the timetabling process and provide management information system reporting. The focus is on user login, course, program, lecture, staff, and student details, as well as time slot, room, lab, class, batch, semester, and department details. The system also includes timetable allocation and generation processes.
Omoregbee Otaninyenuwa Helen, Ihama E. I., Izogie L.E., Otamere Friday Mike (2022)	Web-based Student Time-Table Management System	The article discusses the development of a web-based student time-table management system using a genetic algorithm to solve the complex problem of scheduling lectures and practical timetables for many courses. The system was developed and verified using PHP and MySQL programming languages, and it allows for the generation of different schedules based on user-specified limits and requirements.
Y Ravi Raju, Mayank Mangal (2017)	Web-Based Application for Automatic Timetable Generation	The PDF discusses the development of a web-based application for automatic timetable generation in educational institutions. It addresses the challenges of timetabling problems being NP-Hard and the limitations of existing software solutions. The system aims to simplify the process by generating high-quality timetables for two shifts, handling teacher information, feedback collection, defaulter lists, and performance graphs. The focus is on reducing manual work, improving efficiency, and providing a cost-effective solution for educational institutions.
Kembuan (2018)	Development of Web based Timetabling System	The aim of this research was to develop a web-based timetabling system to optimize the resources using genetic algorithm. The algorithm was tested with the real data containing 47 combined lessons data to be scheduled into 40 timeslots and 8 rooms. The research method used is a design or experimental method. Rapid Application Development (RAD) in system development life cycle (SDLC) model was used as the system development methodology of this Timetabling system. PHP Programming language and MySQL were used in this timetabling application. The results showed that the proposed timetabling system was successfully minimize processing time and provide the optimal solution for the problem.

3.1.1 Requirements

In the realm of web application development, success hinges not only on the aesthetic appeal of the interface or the richness of features but also on the fulfillment of essential functional and non-functional requirements. These two categories of requirements play pivotal roles in shaping the functionality, performance, and user experience of web applications.

Functional Requirements

Functional requirements define the specific behaviors and functionalities that a web application must exhibit to satisfy user needs and achieve its intended purpose. These requirements encompass features such as user authentication, data input forms, search functionalities, content management systems, and interactive elements like chatbots or recommendation engines. Functional requirements serve as the building blocks of a web application's functionality, delineating the actions users can perform and the outcomes they can expect.

Non-functional Requirements

In contrast, non-functional requirements address the attributes that characterize the overall performance, reliability, security, and usability of a web application. These requirements are not concerned with specific functionalities but rather with qualities such as scalability, responsiveness, availability, accessibility, and security. Non-functional requirements ensure that the web application operates efficiently, reliably, and securely under varying conditions, catering to the diverse needs and preferences of users while adhering to industry standards and best practices.

Both types of requirements were collected at the time of conducting interviews with all those interested in the development of the system presented in this article.

3.1.2 Interviews

A set of interviews was conducted with the engineering professors responsible for the process of generating schedules to understand the mechanism used to generate them in school periods. The functional and non-functional requirements of the system were collected. The user types and system requirements for the developed stage are shown in Table 2.

3.1.3 Processes

There is a diversity of processes that are carried out when designing the schedules of the school periods within the engineering area of the university. In order not to make this article too long, the processes that are considered representative are shown and described in Figure 4. All the processes of the generation of academic schedules in the university were automated within the implementation of the web system.

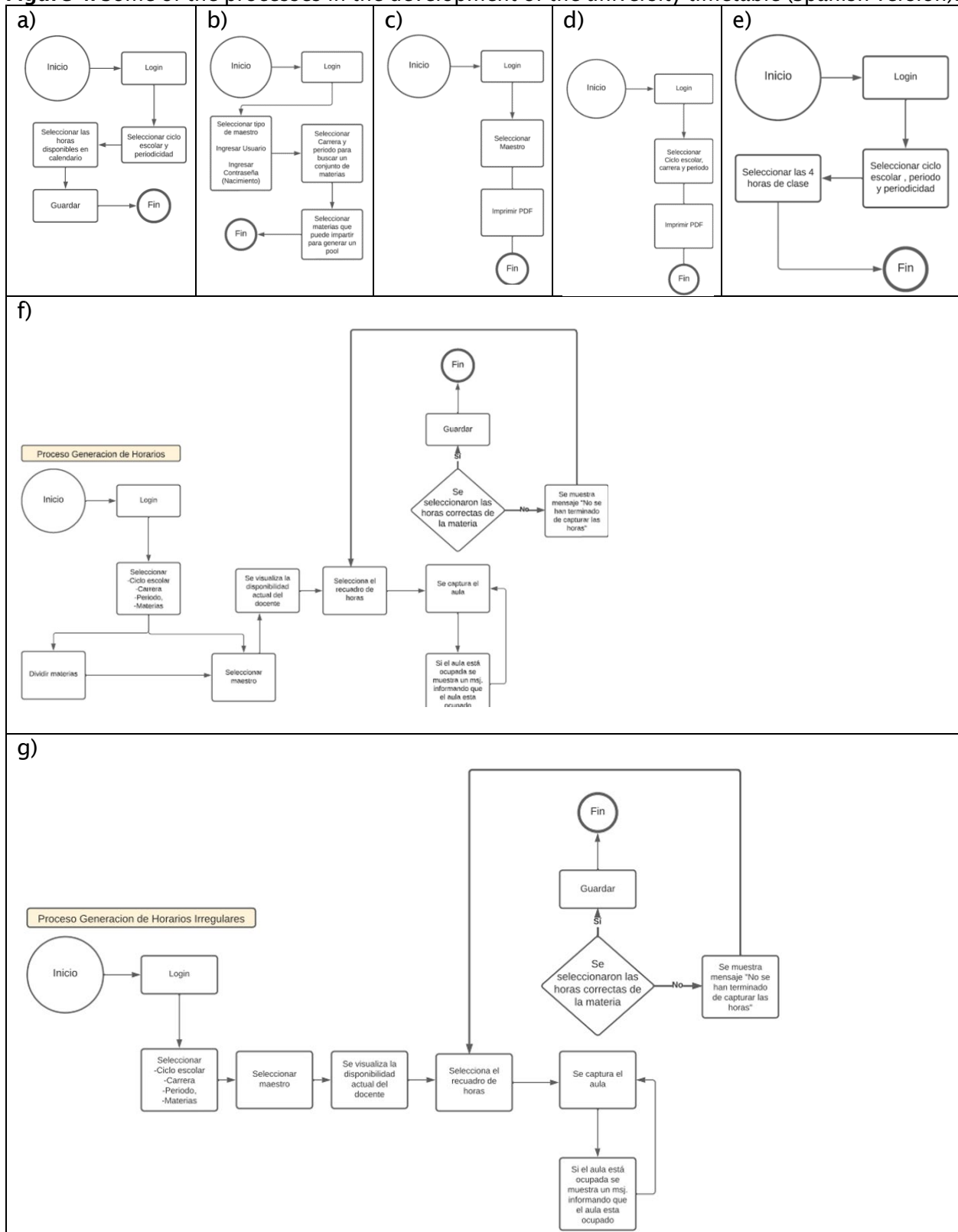
The professor availability process (Fig 4a) refers to the collection and recording of a teacher's time availability for a specific school period. The process begins with the selection of the school year and periodicity by the professor, then he accesses a calendar that shows all the hours available during the selected school year; at this point, he proceeds to mark the hours in which he is available to lecture classes. Once the professor has completed the selection of his available hours in the calendar, the system provides the option to save the information.

The professor registration procedure (Fig 4b) is a procedure carried out by the person in charge of the Engineering area(administrator); First, the person in charge of the area selects the corresponding type of professor, then proceeds to enter the professor's personal information, including his or her username, name and password, which will allow the teacher to identify and access the platform. Subsequently, the career and school period to which the professor will be associated is selected. Once these parameters are defined, the person in charge accesses a set of available subjects(courses). At this point, the selection of subjects(courses) that the professor will be able to teach is carried out. Finally, the changes made are saved in the system.

Table 2: User Types, Functional and Non-functional Requirements.

<i>User Types</i>	<i>Functional Requirements</i>	<i>Non-Functional Requirements</i>
<p>Administrator. - He is responsible for making all the information available for the system to work correctly. He oversees contacting all the teachers involved to gather their information.</p> <p>Coordinator. - Oversees doing all the planning of the system.</p> <p>Professor. - A person who uploads his/her personal availability information to the system.</p> <p>Student.- future implementation</p>	<ul style="list-style-type: none"> · System Home page ▪ System home page display only User Login form and help option. ▪ System identifies correct user type and direct to appropriate pages with given user privileges. ▪ Login username will be same as student registration number. ▪ Default password will be e-mailing address and students able to change their password whenever their need. ▪ If “Incorrect Username or Password” message appears 3 times, then user need contact Administrator to reset password. ▪ There is an accurate validate for username and password. ▪ Successful user login will show a welcome message and direct to employee home page based on their user category. · Course Registration home page must allow to register courses individually and in groups through an Excel file · User Registration home page must allow to register professors individually and in groups through an Excel file ▪ The coordinator and teachers must be able to display their timetable and print in a PDF file. ▪ The coordinator must be able to print the schedule of the races in the area in a period indicated in the interface. ▪The web system must avoid conflicts in schedules, classrooms, teachers, excess or decrease of academic load assigned to each professor. ▪Once all the information has been loaded into the databases, the coordinator will be able to make the planning in a completely graphical interface using the mouse and dragging to organize the schedule. ▪English Courses Home Page must allow the graphic integration of the timetables of the language courses so that these timetables are "blocked" in the scheduling of school timetables. 	<p>Shall be platform-independent, i.e. shall run on any platform (cellular, tablet, PC, etc.)</p> <ul style="list-style-type: none"> · Shall maintain high security and highly reliable · It must be compatible with the institutional colors of the university · Except for the authorized user, no personal information shall be disclosed to system operators or other users · The system shall respond quickly (0.5 seconds or below) to user actions · Shall provide a Graphical User Interface (GUI) for all end-users of the system · The system shall be easy to learn (how to work with) and be able to learn by example · Shall maintain a help facility for “how to use” · The application server should run on Google® technology (web server and database server)

Figure 4: Some of the processes in the development of the university timetable (Spanish version).



The schedule generation process (Fig 4f) is the responsibility of the Administrator. Once inside the system, the coordinator selects the school year in which the classes will be held, as well as the course and the corresponding period. Next, he proceeds to select the subjects that will be part of the schedule. At this stage, the person in charge has the option of dividing a subject into cases where it is necessary.

Subsequently, the professor who will teach the subject is selected. At this point, the professor's availability is displayed, allowing the teacher to make informed decisions about class assignment. The specific times in which the classes will be held are then selected, and the classroom in which the classes will be held is also captured. It is important to mention that if the person in charge has not selected the required number of hours for a subject(course), the system will not allow progress to the next subject(course); Finally, once all the assignments are done correctly and the stipulated hours are met, the changes are saved.

The Irregular Schedule Generation process (Fig 4g) is the responsibility of the Administrator. Once inside the system, the administrator selects the school year in which the classes will be held, as well as the course and the corresponding period. Next, we proceed to select the subjects(courses) that will be part of the schedule. Subsequently, the teacher who will teach the subject(course) is selected. At this point, the professor's availability is displayed, allowing the professor to make informed decisions about class assignment. The specific times in which the classes will be held are then selected, and the classroom in which the classes will be held is also captured.

It is important to mention that if the administrator has not selected the required number of hours for a subject (course), the system will not allow progress to the next subject; Finally, once all assignments are completed correctly and the stipulated hours are met, the changes are saved.

The Schedule Printing Process for professors (Fig 4c) can be used by any system user type. Once inside the system, the user selects the teacher for whom he or she wishes to generate the schedule, which allows access to information related to that professor's class scheduling. Subsequently, the user activates the function by clicking on the "Print PDF" button. The print action generates a PDF file containing the specific schedule for the selected teacher. This PDF file is produced so that it is readable and suitable for printing.

The Schedule Printing Process (Fig 4d) is exclusive to the administrator and Planner. Once inside the system, the manager selects the school year, as well as the course and the corresponding period for which he or she wishes to generate the schedule, which allows access to information related to class scheduling for those parameters. Subsequently, the manager activates the function by clicking on the "Print PDF" button. The print action generates a PDF file containing the specific schedule for the selected period-year-career. This PDF file is produced so that it is readable and suitable for printing.

The English Schedule Generation process (Fig Xe) is the responsibility of the administrator. Once inside the system, the person in charge of the department selects the school year in which the classes will be held, as well as the corresponding period and periodicity. Next, he proceeds to select the 4 hours of class that will be part of the English course schedule for the week.

3.2 System Design

The design of the web solution was divided in a very general way into the development of a project in the Front-end and a project in the part called Back-end, both projects from different students' teams were integrated, finally the solution created was tested.

Front-end development and back-end development are two very important pieces of the software development world. These two components work together to improve the functionality of websites and web applications. While the front end and back-end work closely together in web development, these two kinds of development types involve different tasks.

Front-end development focuses on the client-facing, usability and user experience aspects of a website or web application. This includes designing and optimizing the user interface and working on important visual aspects of web pages.

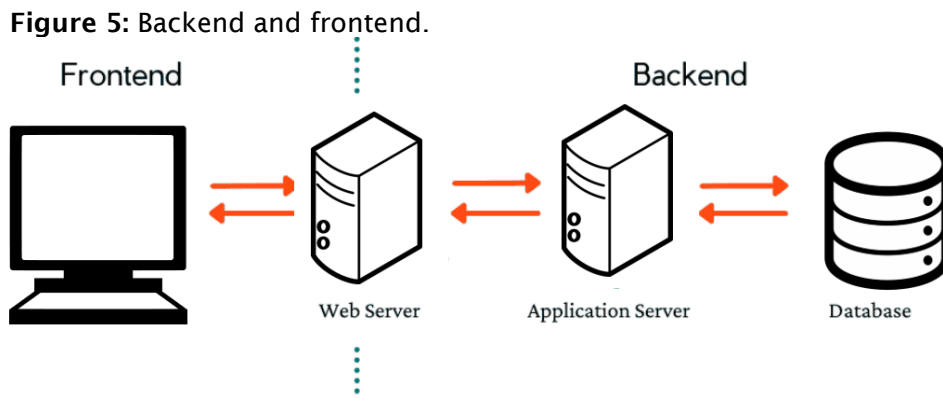
Back-end development focuses on the server-side aspects of a website or web application. This type of development is concerned with website architecture, scripting, and communication

with databases. Back-end code enables the communication between browsers and information from databases. Back-end developers focus on how a website functions, which means they might work with Application Program Interfaces (APIs), code that interacts with databases, libraries, data architecture, and more. Back-end development works together with front-end development to provide users with a functional and interactive experience. Table 3 outlines some of the key objectives and responsibilities of both front end and back-end web development.

Table 3: Front-end and back-end tasks in a web design.

Front-End	Back-End
Create user interfaces that are visually appealing and intuitive.	Develop server-side logic and databases to ensure smooth functionality of web applications.
Implement responsive design to ensure compatibility across various devices and screen sizes.	Manage data storage and retrieval, including handling user inputs and database interactions.
Enhance user experience through interactive elements and smooth navigation.	Optimize performance and scalability of the server-side code to handle increasing traffic and data loads.
Ensure cross-browser compatibility and accessibility standards are met.	Implement security measures to protect sensitive data and prevent unauthorized access.
Collaborate with designers to translate mockups and wireframes into functional web interfaces.	Integrate third-party services and APIs for additional functionality and features.
Utilize HTML, CSS, and JavaScript frameworks/libraries for front end development.	Use server-side languages such as Python, Ruby, PHP, or Node.js along with frameworks like Django, Rails, Laravel, or Express.js for back-end development.

The Figure 5 shows a simplified graphical version of the boundaries of backend and front end.

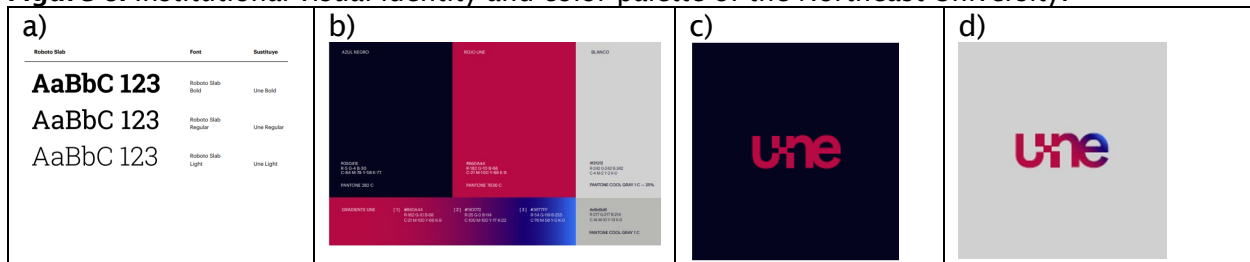


3.2.1 Front End Development

Visual Identity and Color Palette

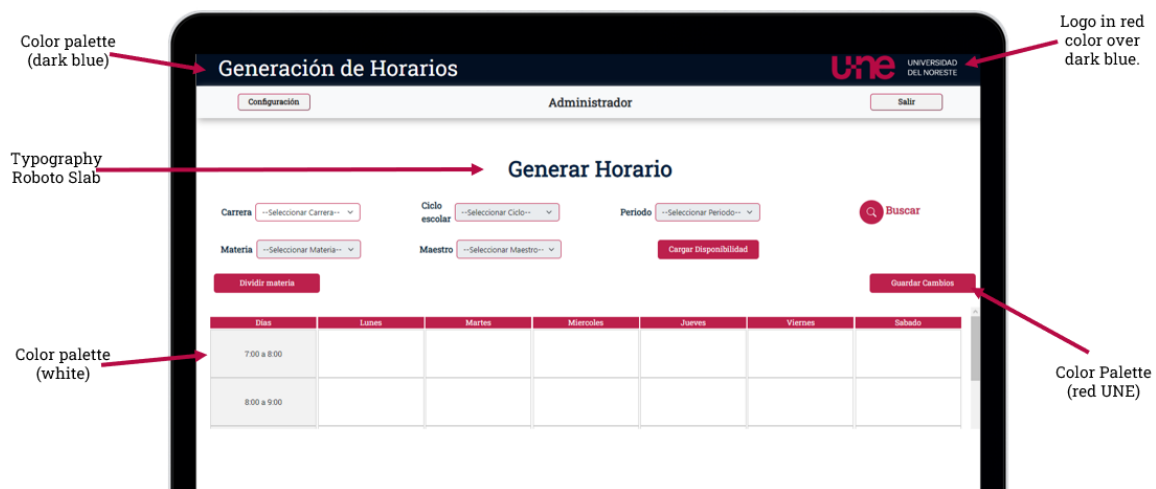
Northeastern University has an official visual identity that must be respected in the development of any software system to be used within the institution. Figure 6 shows the fonts, color palette (a and b) and application to the university logo (c and d) used in the visual part of the development.

Figure 6: Institutional visual identity and color palette of the Northeast University.



The visual identity was applied to all designed screens, this is shown in Figure 7.

Figure 7: Institutional visual identity and color palette applied in the interfaces.



User Interface (UI), Usability and User Experience (UX)

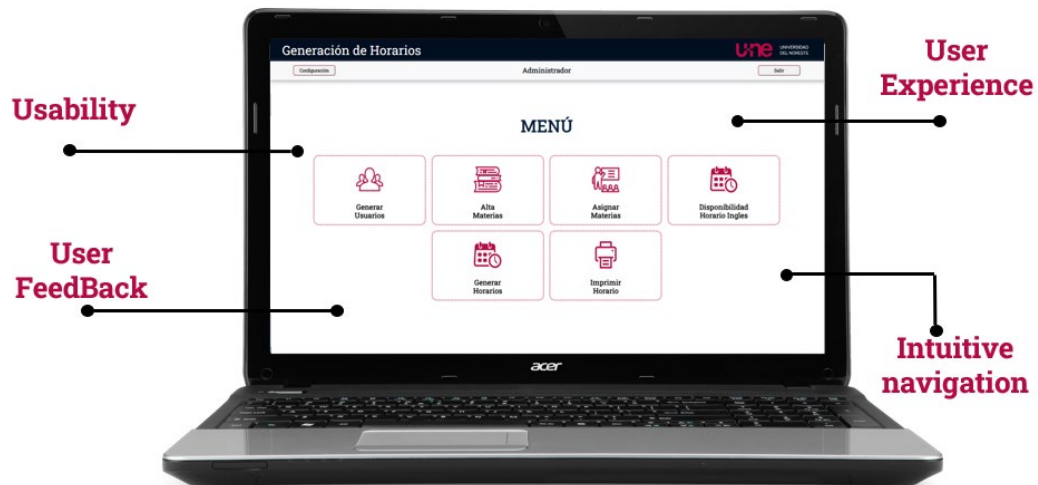
User Interface (UI) design focuses on creating visually appealing and functional interfaces that facilitate interaction between users and digital systems. It involves elements such as layout, typography, color schemes, and interactive components to ensure a seamless user experience. Usability, on the other hand, refers to the ease with which users can navigate and interact with a website or application. It encompasses factors like intuitive navigation, clear information architecture, and efficient task completion. User Experience (UX) incorporates the overall perception, emotions and feelings users derive from interacting with the application. It delves into understanding user needs, behaviors, and emotions to design experiences that are meaningful, enjoyable, and valuable. Together, UI, usability, and UX form the foundation of effective web front-end programming, guiding developers in creating interfaces that are both aesthetically pleasing and user-friendly, ultimately enhancing the overall user experience.

To achieve an adequate design in the aspects of usability and UX in the developed web system, the following stages were followed:

i) Investigation:

During this stage, the greatest amount of information possible and necessary for the project to be carried out was obtained through interviews with those involved. The information obtained in this stage were: Definition of scenarios, understanding of the context, definition of user profiles, definition of the contents of the web application, definition of the general requirements of the project and characterization of the typography and colors to be used.

Figure 8: Foundation concepts of the front-end development.



ii) Organization:

During this stage, it was possible to represent all the possible structures of the contents in accordance with the needs of the users and context of use, and the functional flows of the system (navigation map and flowcharts) were also defined.

iii) Prototyping:

The screens of the web system were defined, proposing several versions of them, evaluating the perception of the end users, the final functionality of the product was also defined, and prototypes of the application interfaces were created.

Technologies Used in the Front-end

The main technologies used for the front-end development were Github like version manager, the Angular framework from Google, HTML and CCS for the format and the page style and some support libraries.

3.2.2 Back End Development

The main task of the backend in the development carried out is to implement the interaction with the database of all the designed interfaces, maintain its integrity and implement all the business logic of the problematic being solved. Figure 8 shows the different actions taken in the navigation of the main particular tasks. The task 9i refers to registration of teachers and courses, 9ii the task of schedule generation, 9iii is the task of division of groups (when a group is large to fit in a classroom or laboratory and must be divided into 2, for example group A and group B), 9iv refers to English schedule, which is the schedule assigned for all students to study English at different levels, 9v is the registration of English teachers, 9vi is the schedule consultation per professor or by academic period and 9vii refers to professor group registration.

The database used is a non-relational database called Firebase of Google, the different object structures stored are shown in Figure 10.

A graphical design in a flowchart of the algorithms used is shown in Figure 11.

Figure 9: Navigation tasks to perform actions in the backend of the system (Spanish).

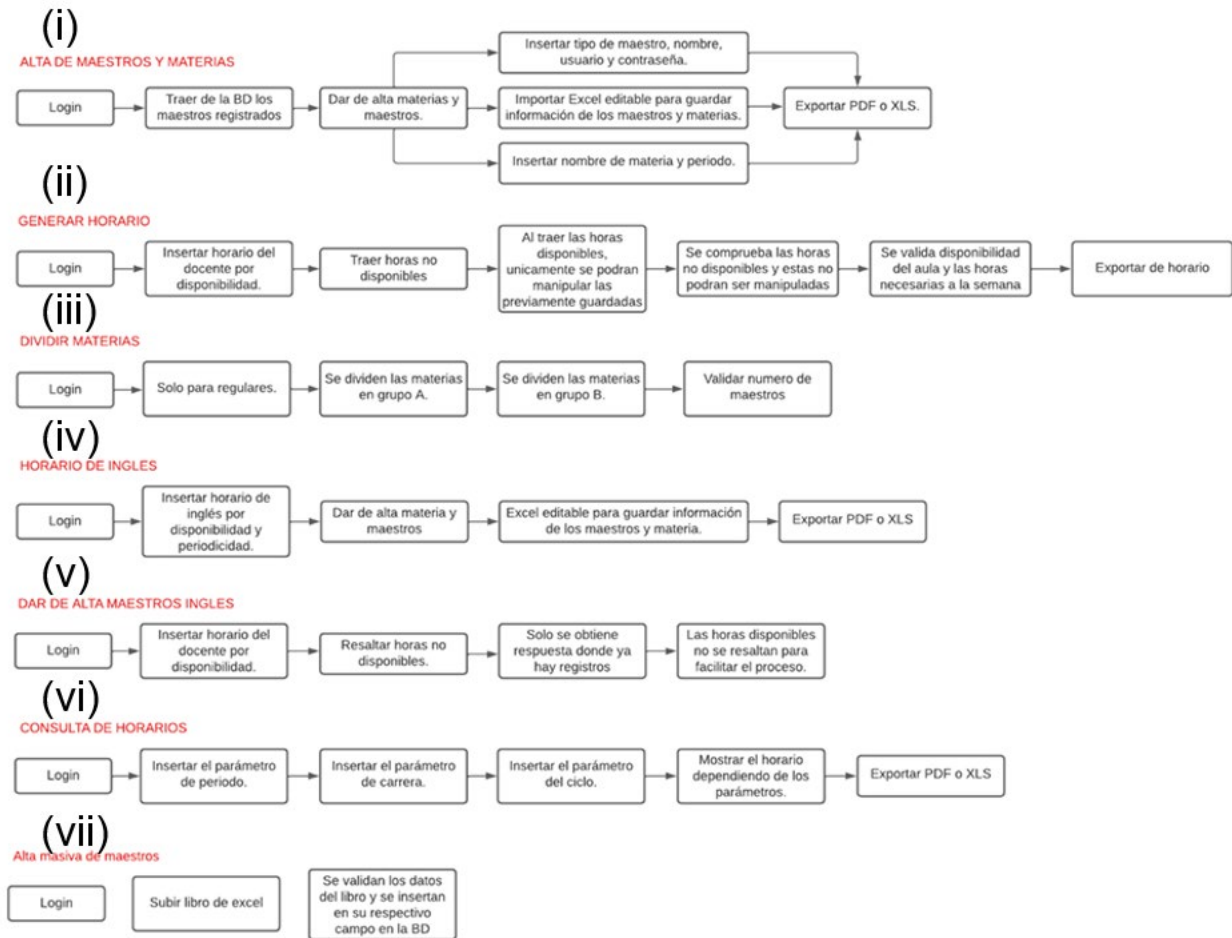


Figure 10: Structures stored in the non-relational database Firebase (Google).

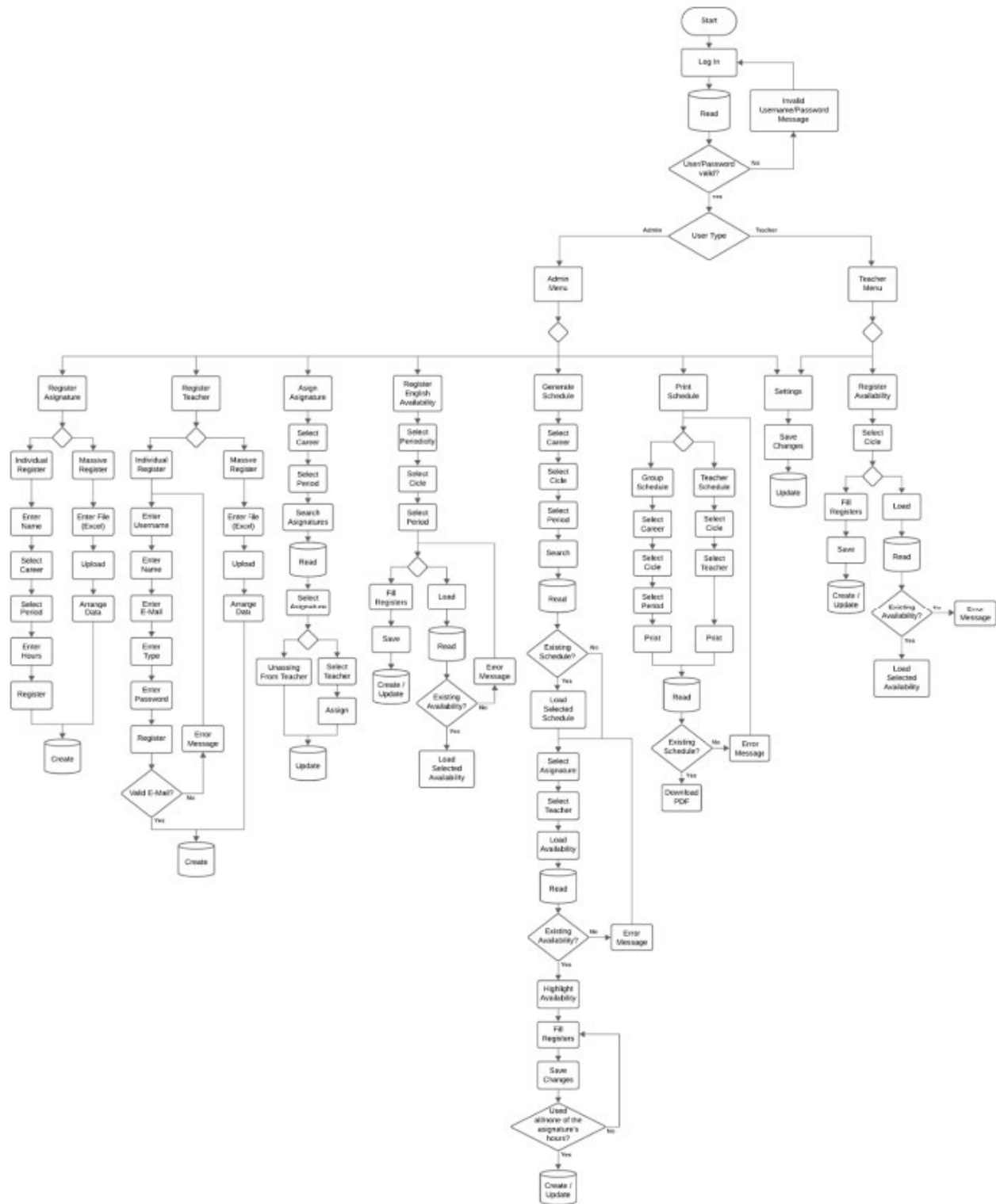
User		Career		Register		Schedule	
Field	Data Type	Field	Data Type	Field	Data Type	Field	Data Type
IdUser	String	IdCareer	String	Field	Any[]	IdSchedule	String
UserId	String	Name	String			Career	String
TeacherType	String	Periodicity	String			Cicle	String
Username	String	PeriodQuantity	Int			Period	Int
Name	String					Teachers	String[]
Mail	String					Asignatures	String[]
Password	String					Regular	Register[]
Asignatures	String[]					Irregular	Register[]
Hours	Int						
TotalHours	Int						
RecentChanges	Bool						

Asignature	
Field	Data Type
IdAsignature	String
Name	String
Career	String
Period	Int
Hours	Int
AvailableHours	Int

TeacherAvailability	
Field	Data Type
IdAvailability	String
TeacherName	String
Cicle	String
Availability	Register[]

EnglishAvailability	
Field	Data Type
IdAvailability	String
Name	String
Cicle	String
Period	Int
Periodicity	String
Availability	Register[]

Figure 11: Algorithms used in the backend.



IV. Results

4.1 Developed Interfaces

The main interfaces developed with which a user interacts with the web system are shown in this section. To optimize data entry and improve the fluidity of user interaction with the screen, various restrictions have been incorporated into the available fields. These constraints are designed to guide the user through a sequential data entry process. In this context, when completing a specific field, the next field in the sequence will be activated automatically, thus allowing the user to fill in the information progressively. Additionally, a logical and coherent arrangement of the fields on the screen has been arranged. This organization has been structured from left to right and top to bottom with the goal of providing an intuitive and easy-to-understand presentation.

Figure 12: Session login interface (Spanish version).

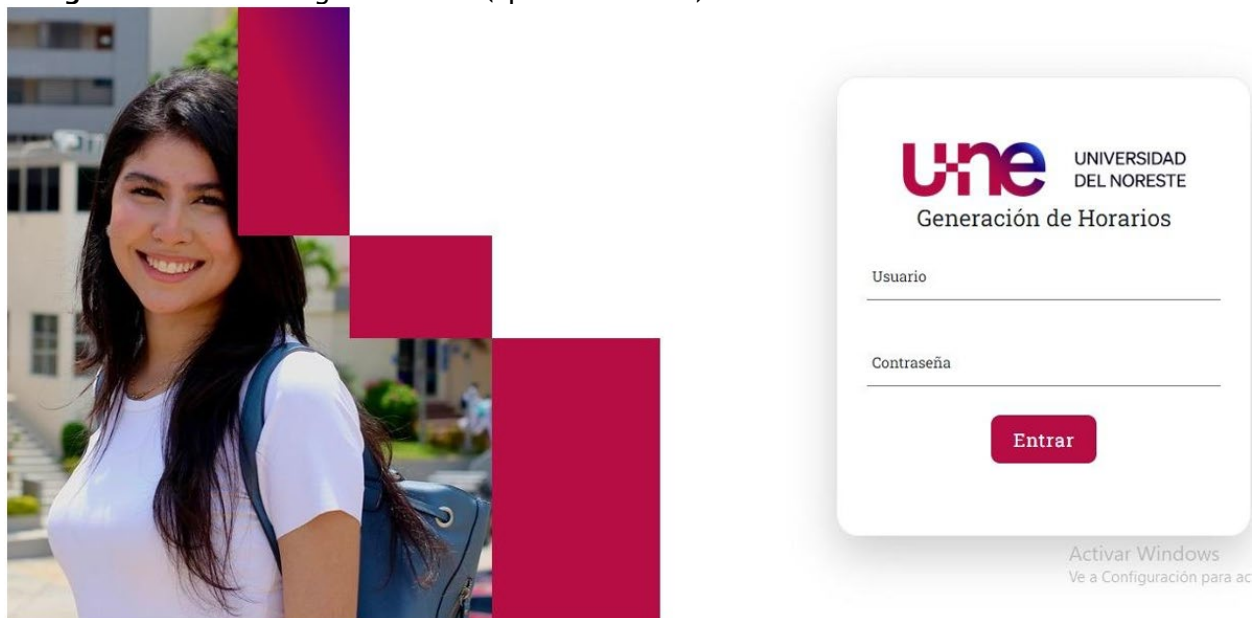


Figure 12 shows the Login screen. Users provide their user ID as well as their password. Once these data have been entered, the user must click on the LOGIN button to access the software web platform.

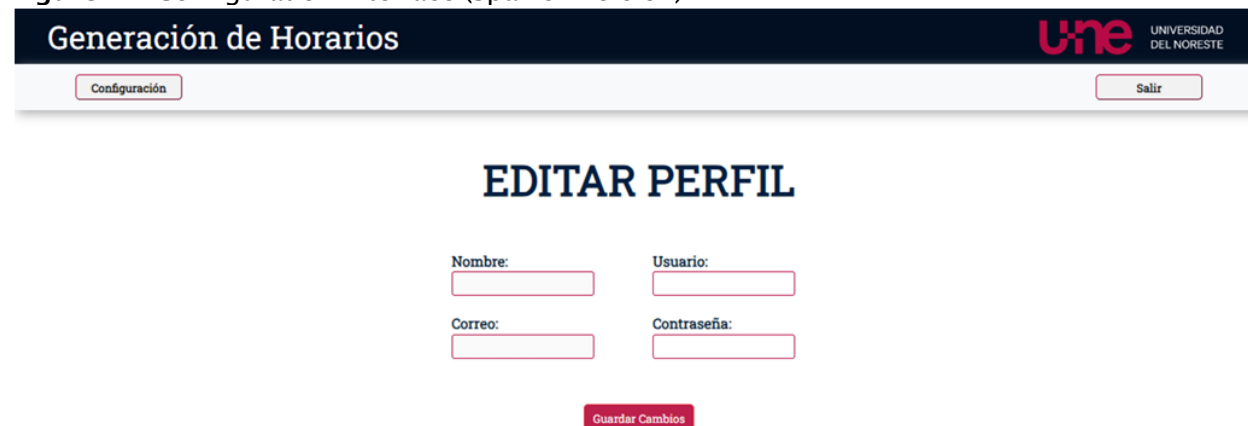
The “Administrator Menu” interface shown in Fig. 13 presents a set of actions that are available to the administrator, these options include the ability to generate users, register subjects, assign subjects, assign the availability of the English schedule, generate schedules, and print schedules. Additionally, at the top of the screen, there is a navigation bar containing two additional buttons. One of these buttons allows the administrator to access their profile settings while the other button allows the user to log out of the application. This screen offers a clear and organized interface that makes it easy to manage the actions relevant to system administration.

The “Settings” interface showing in Fig 14 provides the user with the ability to modify certain elements of their profile. Options available for editing include username and password. However, it is important to note that the user has the ability to view their name and email address, but does not have the power to make changes to these fields. This screen provides an efficient means of managing specific aspects of user profile information.

Figure 13: Administrator Menu Interface (Spanish version).



Figure 14: Configuration interface (Spanish version).



The “User Registration” interface (Fig. 15) allows the administrator to register teachers individually or in groups through an efficient process. For individual registration, the administrator must provide specific information for each teacher, including a username, name, email address, the corresponding teacher type, and a password. In addition, the screen offers the alternative of carrying out a mass registration of teachers through the option of uploading a file in Excel format, which speeds up the process by allowing the incorporation of multiple teachers simultaneously. This screen offers flexibility and efficiency in the teacher registration process, resulting in more effective management of users within the system.

The “Course Registration” interface (Fig. 16) makes it easier for the administrator to register subjects individually for the different careers offered by the Universidad del Noreste. This process involves assigning each subject a specific name, indicating the corresponding major, specifying the relevant academic period and defining the hours associated with the subject. In addition to the individual entry option, the system also provides the administrator with the ability to perform race registration efficiently and expeditiously. To do this, a functionality has been implemented that allows you to load an Excel format file, which makes it possible to massively enter careers. This simplified approach significantly streamlines career management, ensuring greater efficiency and accuracy in the academic administration process.

Figure 15: Registration of individual and group users' interface (Spanish version).

Registro de Usuarios

Registros Individuales

Usuario: Nombre: Correo: Tipo de Docente: Contraseña:

Registrar Usuario

Registros Masivos

Archivo de docentes:

Subir Información

Activar Windows
Ve a Configuración para activar Windows.

Figure 16: Registration of courses interface (Spanish version).

Alta de Materias

Alta Individual

Nombre: Carrera: Periodo: Horas:

Agregar Materia

Alta Masiva

Archivo de materias:

Subir Información

The "Assign Courses" interface (Fig. 17) provides the planner with the ability to assign subjects to teachers based on the degree and academic period selected. Additionally, the screen includes a table at the bottom that shows a list of teachers with previously assigned subjects, thus providing a clear and detailed view of existing assignments. This screen is an effective tool that facilitates the management and monitoring of courses assignments to teachers in the context of the system.

The interface for generating schedules allows obtaining a map of the current configuration of schedules for a defined career and school period (Figure 18). Loading the availability of each teacher who teaches in that school period and being able to accommodate each period in a cell of a rectangular map, marking with a different color when selecting the chosen hours (Figure 19) in such a way that the shape is more visually attractive. to interact with the user, in addition to being able to correct the schedules in a drag-and-move style with the computer mouse.

Figure 17: Registration of course-teacher interface (Spanish version).

Generación de Horarios une UNIVERSIDAD DEL NORESTE

Configuración Administrador Salir

Asignación de Materias

Carrera:
 Período:
 🔍 Buscar Materias

Materia:
 Asignar a Docente: buscar Asignar

Maestros con la Materia Asignada

Nombre	Tipo de Docente	Correo	Materias	Acciones
--------	-----------------	--------	----------	----------

Figure 18: Timetable generation (Spanish version).

Generación de Horarios une UNIVERSIDAD DEL NORESTE

Configuración Administrador Salir

GENERAR HORARIO

Carrera
 Ciclo escolar
 Período
 🔍 Buscar

Materia
 Maestro
 Cargar Disponibilidad

Dividir materia
Guardar Cambios

Días	Lunes	Martes	Miércoles	Jueves	Viernes	Sabado
7:00					Activar Windows <small>Ve a Configuración para activar Windows.</small>	

Figure 19: Selecting cells in the schedule (Spanish version).

Generación de Horarios une UNIVERSIDAD DEL NORESTE

Configuración Administrador Salir

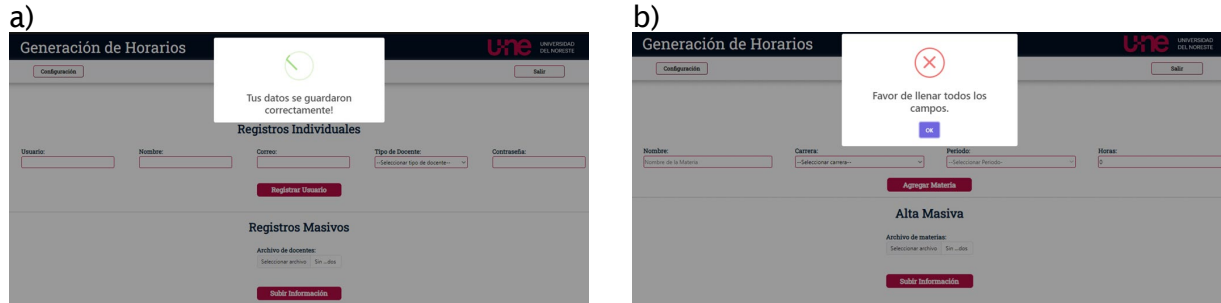
Disponibilidad Horario Ingles

Periodicidad
 Ciclo escolar
 Período
 Guardar Cambios

Días	Lunes	Martes	Miércoles	Jueves	Viernes	Sabado
7:00 a 8:00		Cuatrimestral 7° Período	Cuatrimestral 7° Período	Cuatrimestral 7° Período		
8:00 a 9:00		Cuatrimestral 7° Período	Cuatrimestral 7° Período	Cuatrimestral 7° Período		
9:00 a 10:00						

In different interfaces, the correct or incorrect completion of a task is confirmed. In case there is a problem, the user is given a report of what the problem was. Figure 20a shows a successful case for the user registration interface and Figure 20b shows a failed case for the course registration interface, the latter cannot be done unless all the fields are selected or filled out correctly (period, major, subject, teacher, etc.)

Figure 20: Showing correct and incorrect procedure to the timetable generation (Spanish version).



When planning a schedule for regular students, information on all courses for a school period is loaded. An irregular student is one who is behind the generation with which he/she entered the university because he/she failed one or some subjects. At this stage, generating your schedule is a little more complicated since you must load course by course that the student can take and accommodate the schedule of the professors who can teach those courses (Figure 21).

Figure 21: Generation of irregular student schedule (Spanish version).

Horario Irregular

Materia Maestro

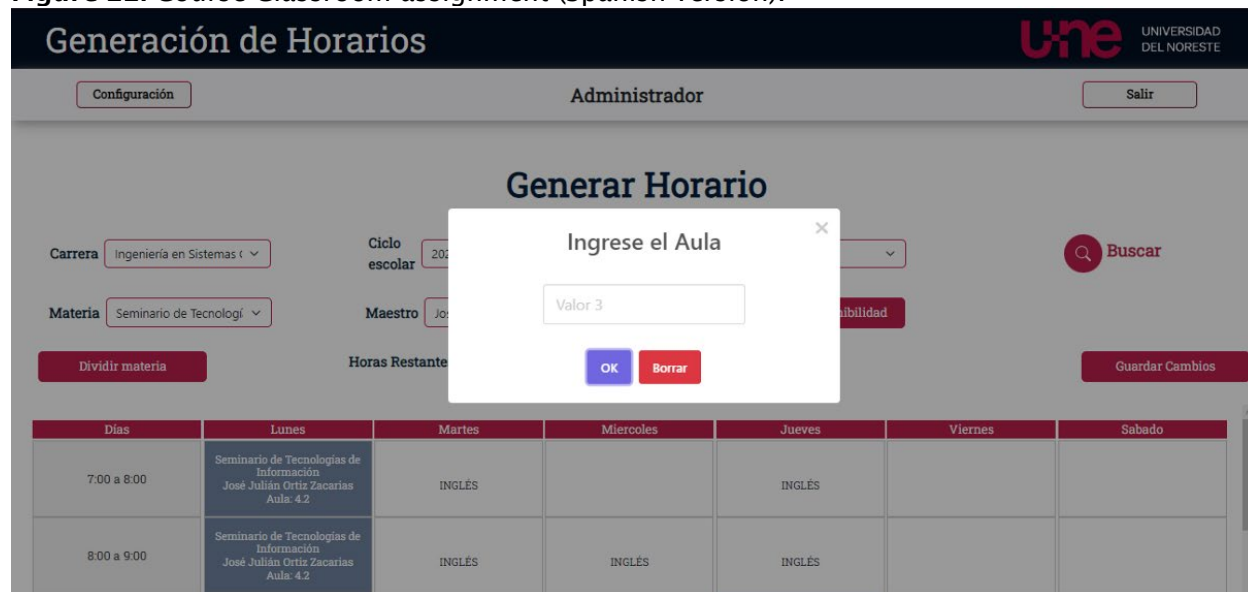
Dias	Lunes	Martes	Miercoles	Jueves	Viernes	Sabado
7:00						
8:00						
9:00						

Activar Windows
Ve a Configuración para activar Windows.

To optimize the classroom assignment process for scheduled classes, a functionality has been implemented that allows the administrator to enter the specific location by clicking on a previously selected cell. When activating this action, a window designed to facilitate the introduction of the necessary information (Figure 22) about the specific classroom where that course will be taught is displayed.

An updated video showing the full functionality of the web system can be viewed on the YouTube platform [16].

Figure 22: Course-Classroom assignment (Spanish version).



V. Conclusions

This project was undertaken to minimize the intensive manual effort that is being made to establish and build timetables for a private university in Tampico, Tamaulipas, Mexico. The Web-based timetable system can produce intuitive and friendly manual designing of near-optimal schedules depending on several constraints. The timetable system allows multiple users access (administrators, planner, professors and soon students) with responsive design, provided there is an internet connected device. The login requirement secures the system from unauthorized users and modifications. With this approach, timetable management has been made simpler as it is a web application to generate and export timetable in PDF format that can be easily shared on internet enabled devices.

Our solution was developed using Google technology frameworks and libraries to simplify and boost the development process. Most of these well-established libraries and frameworks offer rich features and strong development benefits. This application successfully accomplished hard constraints to achieve a feasible and efficient timetable schedule for students and lecturers. Our system can be modified as per user needs and offers an attractive user interface with the best practices to design front-end and back-end web applications systems.

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Local Innovation as a Response of Import Competition

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Abstract

Import competition from Chinese firms in the early 2000s caused massive economic disruptions in US counties that had high manufacturing employment. Instead of completely collapsing, these areas reinvested in a key engine of local growth: innovation. Using patent data from the United States Patent and Trademark Office, I exploit US tariff policy and China's ascension to the World Trade Organization to find that import competition encouraged innovation. Import competition also resulted in relatively larger percentage increases for non-white inventors, Hispanic inventors, and female inventors. I also find evidence of two mechanisms by which import competition affects innovation. First, larger firms, or those likely to be technological leaders, drive the increase in patenting by leveraging their market position to increase their own innovation when faced with import competition. Second, the increase in innovation is partly caused by an increase in enrollment in engineering and physics programs at local universities.

Keywords: Innovation; import competition; race; gender

JEL Classification: O30; F60; J10

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Effects of Sub-national Institutions on Localized Innovation: Evidence from United States Counties

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Abstract

The influence of institutions on innovation is well documented at the country and state levels; however, less is known about county level effects. This study extends past work in these larger geographic contexts by considering political institutional effects at the sub-national level, in this case US counties, on innovation support and outcomes. Innovation factor levels in an area are important indicators of economic development and growth there. To measure effects of both informal and formal political pressure, county level political affiliation was calculated using the mean percentage (Democrat versus Republican) across five presidential contests. Data from over 94% of US counties was analyzed using hierarchical linear regression. The independent variables of mean Democratic and Republican presidential vote for each county are examined against four dependent measures of innovation considering important support factors (venture capital and business incubator support) and outcomes (patents and initial public offerings). In support of the hypotheses, we find that Democratic leaning counties provide a more favorable political institutional environment for firm innovation there. These results have important implications for better understanding the role of political institutions in attracting and developing innovative business activity at the sub-national level.

Keywords: Institutional influence; Sub-national institutions; Political institutions; Innovation

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Okun's Law and its Implications for Enterprises in High-Frequency Innovation Cycles

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Abstract

This paper investigates the applicability of Okun's Law as a framework for understanding the dynamics of volatile market conditions within developing countries with enterprises characterized by high-frequency innovation cycles. Okun's Law traditionally describes the relationship between changes in unemployment and gross domestic product (GDP), providing insights into economic growth and employment dynamics. In the context of sectors marked by rapid technological advancements and short product life cycles, such as those experiencing high-frequency innovation cycles, understanding the implications of Okun's Law becomes critical for enterprises seeking to navigate volatile economic environments. Through an examination of empirical evidence and theoretical models, this paper explores how fluctuations in unemployment, driven by shifts in GDP growth, influence the strategic decisions and operational challenges faced by enterprises operating within high-frequency innovation cycles. Additionally, it clearly shows the role of government policies, technological disruptions, and labor market flexibility in shaping the relationship between economic growth and employment dynamics. By integrating insights from Okun's Law with the unique challenges of high-frequency innovation cycles, this paper provides an easy understandable framework for enterprises to enhance their strategic planning and adaptability in dynamic market environments.

I. Introduction

Enterprises operating within industries characterized by high-frequency innovation cycles face unique challenges and opportunities in managing their operations and human capital. These sectors, which include technology, biotechnology, and other fast-paced industries, experience rapid technological advancements and short product life cycles, necessitating agility and adaptability in response to market dynamics. Understanding the relationship between economic growth and employment within such environments is essential for enterprises to effectively navigate changing labor market conditions and formulate strategic responses. Okun's Law, a well-established economic principle linking changes in unemployment to fluctuations in gross domestic product (GDP), offers a valuable framework for analyzing these dynamics. This paper explores the implications of Okun's Law for enterprises operating within high-frequency innovation cycles, examining how variations in GDP growth influence labor market conditions, organizational strategies, and overall performance.

II. Literature Review

Okun's Law, first proposed by economist Arthur Okun (1962), posits an inverse relationship between changes in the unemployment rate and changes in GDP. Okun's law is one of the basic rules of thumb of macroeconomics. It measures the trade-off between unemployment and output. One reading of Okun's law tells how much growth is needed to reduce unemployment by one

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percentage point. Another reading measures the cost of unemployment in terms of forgone output.

In the context of high-frequency innovation cycles, where technological disruptions and market dynamics occur rapidly, the applicability of Okun's Law is easy to understand. Previous research has highlighted the importance of understanding the structural shifts and labor market dynamics within innovative industries, as well as the role of government policies and business strategies in shaping employment outcomes.

III. Method

This paper employs a combination of theoretical analysis and empirical evidence to investigate the implications of Okun's Law for enterprises in high-frequency innovation cycles.

One of the most widely used empirical specifications takes the following formula on Okun's law:²

$$y - y^*/y^* = -\beta \times \Delta u$$

Where y represents the actual GDP (Gross Domestic Product) of the economy; y^* represents the potential GDP, which is the level of output that the economy can sustain without causing inflation; β is the Okun coefficient, representing the relationship between changes in the unemployment rate and changes in GDP; u is the unemployment rate for the current year; u^* is the unemployment rate for the previous year; and Δu denotes the change in the unemployment rate from the previous year to the current year.

The left-hand side of the equation, $y - y^*/y^*$, represents the output gap, which is the difference between the actual GDP and the potential GDP, normalized by the potential GDP.

The right-hand side of the equation, $-\beta \times \Delta u$, represents the change in unemployment rate multiplied by the negative Okun coefficient, indicating the inverse relationship between unemployment and GDP growth. A negative coefficient implies that as the unemployment rate decreases (indicating an improving labor market), GDP tends to increase.

Traditionally, the Okun coefficient has been assumed to be 2, indicating that a 1% decrease in the unemployment rate is associated with a 2% increase in GDP relative to potential GDP. However, this coefficient may vary depending on economic conditions, structural factors, and policy interventions. In contemporary scenarios, the Okun coefficient may deviate from 2 due to changes in labor market dynamics, technological advancements, globalization, and other factors influencing the relationship between unemployment and GDP growth.

Below is the review of existing results on Okun's Law from North Macedonia indicating in the given time period different external and internal factors that change labor market dynamics, and innovation cycles. This is the contextual background in which selected enterprises work. Also, this can assist in developing a conceptual framework for analyzing the relationship between economic growth, employment, and performance output within innovative industries.

Table 1.³

year	2015	2016	2017	2018	2019	2020	2021	2022
real GDP (y)	3.9	2.8	1.1	2.9	3.9	-4.7	3.9	2.1
Potential GDP (y*)	4	3.5	1.5	3	4	-4	4.5	2.5
Unemployment rate current year (u)	26.1	23.7	22.4	20.7	17.3	16.4	15.7	14.4
Unemployment rate previous year (u*)	28.0	26.1	21.9	19.4	16.6	16.1	15.2	14
production gap (y-y*)	-0.1	-0.7	-0.4	-0.1	-0.1	-0.7	-0.6	-0.4
Okun's coefficient (β)	0.013157895	0.083333333	-0.533333333	-0.02564103	-0.03571429	0.583333333	-0.266666667	-0.4

² Elhorst, J. Paul, and Silvia Emili, 2021. "Regional Economic Growth Patterns: A Comparative Analysis."

³ The used statistical data are from National Bank of the Republic of North Macedonia. "Basic economic indicators." https://www.nbrm.mk/osnovni_ekonomski_pokazатели.nspix

The utilized statistical data are from public available data of the Central Bank of North Macedonia and the selected results tend to illustrate the practical implications of Okun's Law for enterprises.

IV. Results

Our analysis suggests that Okun's Law provides valuable insights into the labor market dynamics of industries experiencing high-frequency innovation cycles. Fluctuations in GDP growth can significantly impact employment levels within these sectors, influencing hiring decisions, workforce composition, and organizational strategies. Moreover, the rapid pace of technological change and market disruption in innovative industries necessitates flexibility and adaptability in labor market policies and practices. Enterprises clearly proactively manage their human capital to respond to changing economic conditions and maintain competitiveness in dynamic market environments. Government policies play a crucial role in supporting labor market flexibility, promoting skills development, and fostering innovation, thereby shaping the overall impact of Okun's Law on enterprise performance.

Selected results from enterprises

Technological development challenges enterprises to constantly change their information systems. Their relations diversify as it pushes human to human, human through machine, human to machine and eventually machine to human interactions and operations that incorporate enterprises. This puts enterprise knowledge base diversification and its relevant use high priority within enterprises. Information systems within the enterprise are used optimally when knowledge management practices obtain results, an innovation (of a new product/services/process). Below it is shown with selected survey results to how and why knowledge base is used and is put into innovation context within enterprises.

V. Theoretical Background

What strategic choices are there regarding innovative activities in the enterprise? The diversification of the knowledge management practices that lead to innovation are explored. Questions covered in empirical research below: Where does individual knowledge immerse with organizations, how it is disseminated or used in their respective field and what results has it given? What is the reason why innovation in respective enterprise is successful, how does it happen?

New products and services increase the labour productivity of innovating enterprises by changing the distribution of labour nationally and internationally (cited in Witt 2016, 2; Metcalfe et al. 2006). This change is constant and even more relevant when the technology change pushes the frontiers in every field, every enterprise low or high innovative.

Employee knowledge can be captured in explicit form, easily recognizable and transmitted, both through personal contact and through other synchronic or asynchronic communication channels. It can also be tacit knowledge, unconscious knowledge. Both forms make the basis for the total knowledge (learned theoretical and experiential knowledge) that is unique to every individual, and is different, some of it not conscious (if conscious, it could be transmitted), simply obtained by working on a particular activity or pursuing particular interest.

Since knowledge is personal and has not a value if it is not used, the indicator of knowledge facilitation is the frequency how often the innovation cycle within enterprises is used and in resulting new value for the enterprise.

Knowledge Management Practices

Knowledge management methods are used to enable the enterprise to utilize and capture individual knowledge combined with organisational and outside knowledge as much as possible. Knowledge management practices develop knowledge base and skills that improve the organization performance, in order one maintain competitive, efficient, and innovative level of operation.

Customized Knowledge Management Cycle Model

Building on the Evans and Ali's (2013) Lifecycle Model The Knowledge Management Cycle (KMC) is advanced and consists of 7 phases: 1. to identify, 2. to preserve, 3. to share, 4. to use, 5. to learn, 6. improve and 7. Create new knowledge here modified into Innovate. (Evans, Max, Kimiz Dalkir, and Catalin Bidian 2014, 91)

Below are given the results from the survey conducted by the author that included the phases: share and create new knowledge.

Commercialisation of Innovation

Different definitions of innovation state the most important message, which is that innovation, must bring something new or new to the enterprise, national market and global market in order to be considered innovative. Simply said, innovating or being involved in innovation activities helps companies stay competitive. The knowledge base brings them forward in their respective industries or markets.

Technological, Product and Process (TPP) innovation activities represent all the scientific, technological, organizational, financial, and commercial steps that are actually taken to bring about the implementation of technologically new or improved products and processes. Some are highly innovative; others are not so new but needed for realization (Oslo Manual 2018,32).

The survey undertaken by the author includes innovative activities in selected enterprises. Below are the selected samples of the research questions, which are included for measuring the innovative activities of the first category.

An innovative enterprise is defined as an entity that has successfully implemented a technologically new or significantly improved product / service / process or combination of previous ones over a period of time under investigation. (Oslo Manual 2018,11)

VI. Empirical Survey and Findings

The selection of enterprises was conducted by the author through previous research data analysis for the Master research paper, personal contacts and public known contacts for enterprises that have introduced new and/improved product/service/process for the period of interest of five years. This data is collected and analysed from enterprise employees to the best of their knowledge and experience working within the respective company. The data was collected from the period of June to December 2017 within selected enterprises (in total 38) from Republic North Macedonia.

Total number of respondents who completed the questionnaire is 176, whereas 165 responds were complete or 93.75% of the respondents is analysed in this survey.

The employees were from enterprises that had the following type of business activity:

1. production - 48 respondents or 29.09% of total number of responses
2. service - 77 respondents or 46.67% of total number of responses
3. production-service- 40 respondents or 24.24% of total number of responses

The questionnaire was constructed with 6 general contextual questions and 22 subject related questions, linked to the relevant aspect of the research that was conducted.

Localisation of Knowledge

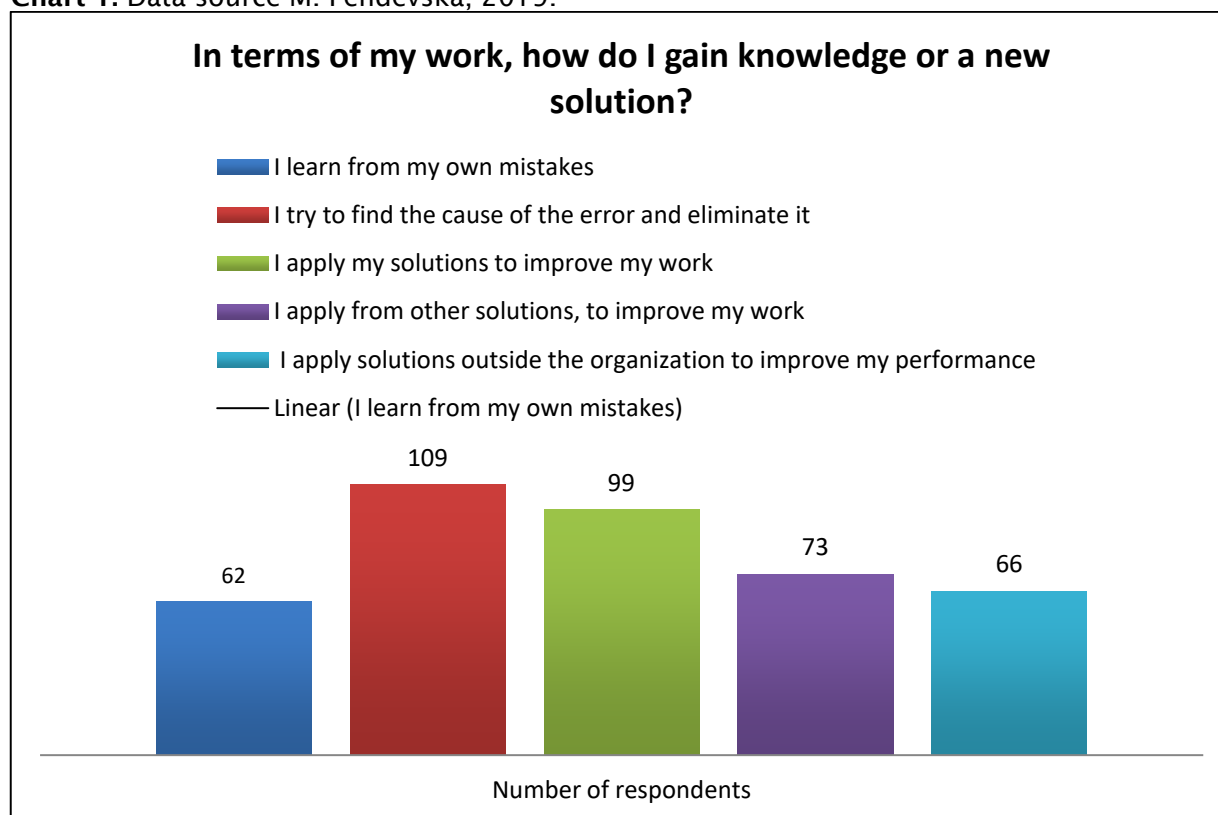
This is an attempt to find an answer to where the individual shares its expert knowledge, internally in the organization, locally in the environment where one works, whether professional knowledge is required and latest developments in knowledge, technique and technologies from universities and institutes, partner organizations or client organizations with which they have complementary knowledge for the development of new products / services?

I share relevant information through which communication channels? (multiple answers possible)

Table 2: Data source Q1 from the survey M. Pendevska, 2019.

I	In terms of my work, how do I gain knowledge or a new solution? (Gathering knowledge in the organization)	Number of respondents	%
1	I learn from my own mistakes	62	15,16%
2	I try to find the cause of the error and eliminate it	109	26,65%
3	I apply my solutions to improve my work	99	24,21%
4	I apply from other solutions, to improve my work	73	17,85%
5	I apply solutions outside the organization to improve my performance	66	16,14%

Chart 1: Data source M. Pendevska, 2019.



Explanation

Knowledge is personal and it is not easy to be measured. One way possible is, how it is used by the individual and by the organisation? Nurturing and establishing everlasting procedures is not viable anymore, there is simply not enough time to be maintained. As dynamic category, procedures are created to serve its purpose, with technological change, they change. So, nurturing a mindset that enables knowledge sharing is the real challenge within enterprises. Thus is hard to establish and much harder to sustain. One popular methodology is Agile methodology and is based on interaction of personal and group knowledge sharing. There is no easy way in knowledge sharing, if work procedures not relevant and not updated, new knowledge flow will cease to exist. It will be flown only knowledge that is expected to be received.

In this survey, most responses to Q1 affirm personal commitment in order to share only controlled and examined information, further processing it with personal engagement and organisational commitment for incremental improvement of established procedures. Having possibility to incorporate own personal increments and possible solutions that “were invented somewhere else but happily incorporated by us”. This suggests a combined approach to sharing information within respective enterprises.

Why Has Innovation Occurred?

To try to answer why the innovation activity has happened within enterprise, to find the context of the innovation activity in the respected enterprise, the objective approach is chosen (Oslo Manual, 2018), i.e., to collect selected data on an innovative activity in an enterprise.

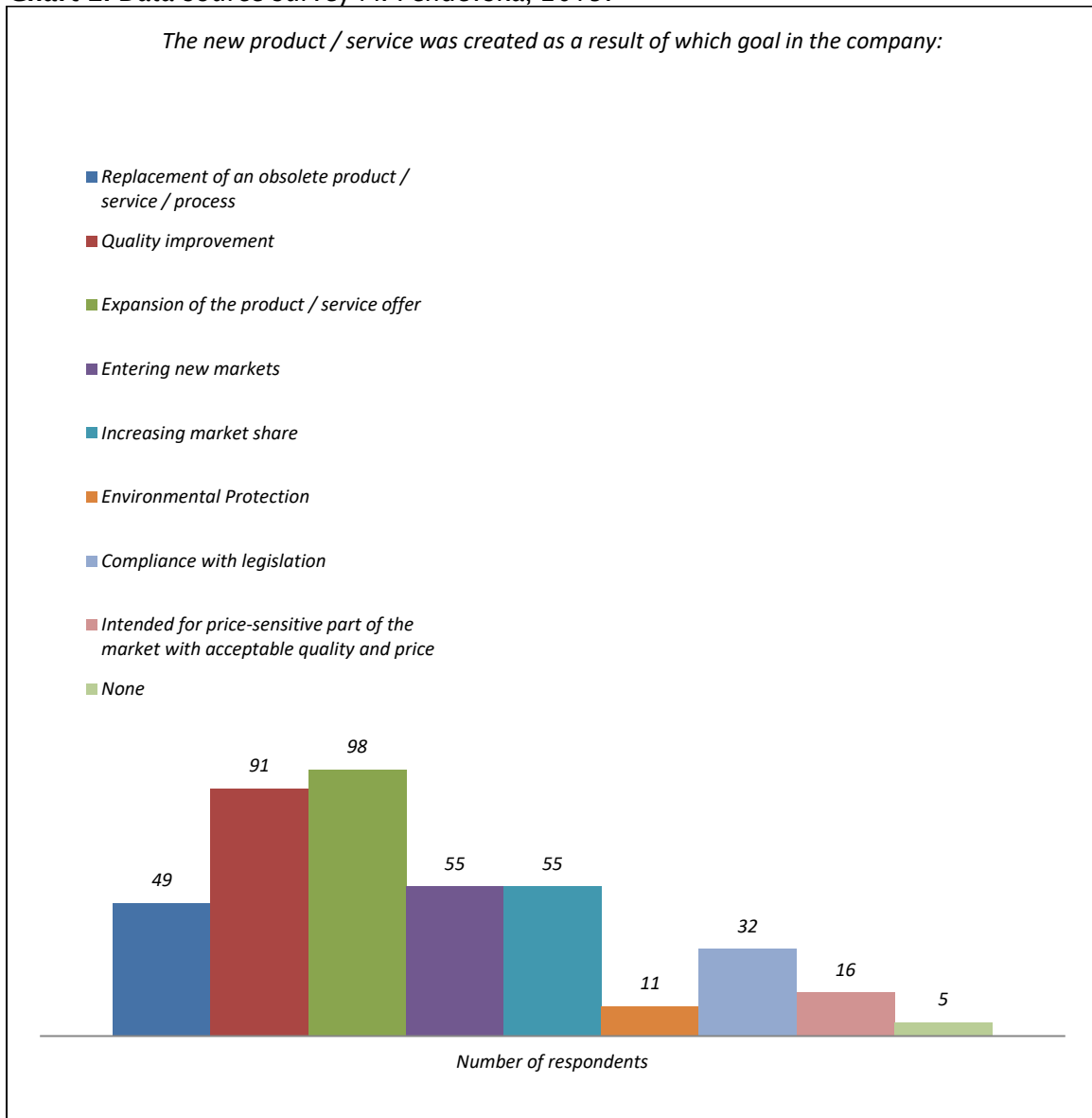
According to the previous definition, the selected questions should answer: Why the existing knowledge base within the enterprise was used? Why the innovation has resulted into products/services within enterprises? (This is multiple choice question)

To get initial information on enterprise innovation activities, respondents had to complete the following basic company information and innovative product or services.

Table 4: Data source Q17 from the survey M. Pendevska, 2019.

XVII	The new product / service was created as a result of which goal in the company:	Number of respondents	%
1	Replacement of an obsolete product / service / process	49	11,89%
2	Quality improvement	91	22,09%
3	Expansion of the product / service offer	98	23,79%
4	Entering new markets	55	13,35%
5	Increasing market share	55	13,35%
6	Environmental Protection	11	2,67%
7	Compliance with legislation	32	7,77%
8	Intended for price-sensitive part of the market with acceptable quality and price	16	3,88%
9	None	5	1,21%

Chart 2: Data source survey M. Pendevska, 2019.



Explanation

The knowledge base of the respective enterprises is used mostly to expand existing offer. The question "expansion of production / service offer" was answered by 98 respondents or 23.79% of the total responses.

The incremental improvement is indicated by the request "quality improvement" selected by 91 respondents or 22.09% of the total responses.

Strengthening the position of the company through "entering new markets" or applying new knowledge to conquer new market segments selected by 55 respondents or 13,35% of the total number of responses.

The strengthening of its market position on the existing market through incremental novelties is shown through "increasing a market share" selected by 55 respondents or 13,35% of the total number of responses.

Maintaining its market position through the question "replacement of obsolete product / service / process" selected by 49 respondents or 11.89% of the total number of responses.

Due to legislation amendments and harmonizing enterprises` operations with their legal provisions, the question "compliance with the legislation" was selected by 32 respondents or 7.77% of the total number of responses.

Creating a frugal innovation, or a novelty with acceptable quality and widely acceptable price, i.e., "intended for price-sensitive part of the market with acceptable quality and price" selected by 16 respondents or 3.88% of the total number of responses.

Creating products that are produced with improved technology that provides better "environmental protection" was selected by 11 respondents or 2.67% of the total number of responses.

"No" reason / or some other reason chosen by 5 respondents or 1.21% of the total number of answers.

Frequency of Innovation Cycle in Enterprises

Measuring how often the innovation cycle is used within the enterprises, shows healthy and fit enterprise that is in line with the market conditions on a regular basis.

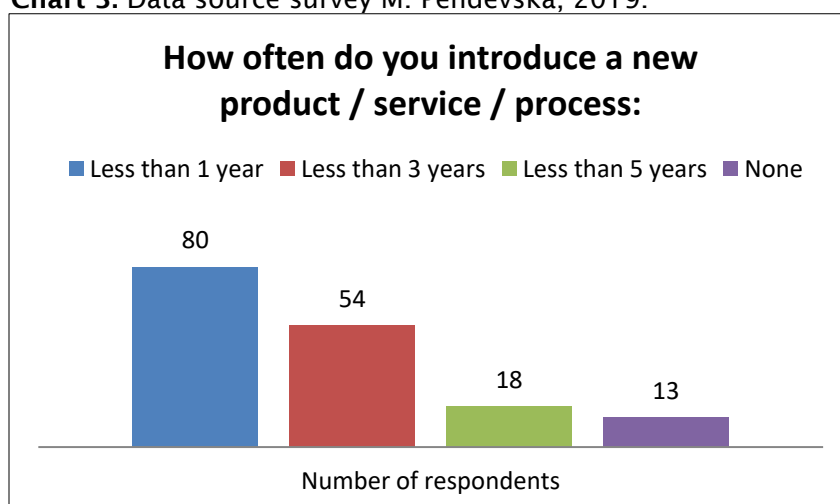
Table 4: Data source Q19 from the survey M. Pendevska, 2019.

XX	How often do you introduce a new product / service / process:	Number of respondents	%
1	Less than 1 year	80	48.48%
2	Less than 3 years	54	32.73%
3	Less than 5 years	18	10.91%
4	None	13	7.88%

Results

It is clear that the enterprises are working with short innovation cycles, which shows fit and proactive working strategy from the majority of answers. Depending on the enterprise strategy, and the successful market profitability, it seems that the selected enterprises are using their knowledge base regularly.

Chart 3: Data source survey M. Pendevska, 2019.



VII. Conclusion

Enterprises work in an uncertain environment. Their strength is how successfully they can make profit and that often depends on how often they introduce new product/service /process. That is connected directly with the regular usage of their knowledge base. So, their purpose is to capture the knowledge within the enterprise, as well the one in and out of the enterprise environment and utilized as much as possible and as often as possible. The knowledge resides in different forms (tacit/implicit/explicit) and can be shared using different channels of communication (interaction human to human, human through machine, human to machine and eventually machine to human).

The management literature explains why innovative activities are elaborated as the main strategy for gaining competitive advantage and generating long term sustainable profits. The persistence of doing this effort, is shown in the diversification of knowledge sources in order producing innovation as new product/service/process. The research results obtained from this inquiry confirm both.

As the Chinese proverb says: "When wind of change blow, some (people/enterprises) are building walls and some windmills". Changes happen all the time, the ability to use the change in its own benefit and be ready for whatever comes, lies within the ability to stay active in searching most suitable solutions following the path that enables continuous learning. Every technological change pushes organizational change that result in different innovative activities. Main challenge, of course, is to maintain, sustain, create conditions within the enterprise for long-term innovative activities.

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Experimenting with Inventory Policies in a Retail Supply Chain: Some Reflections and Takeaways

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Abstract

As is well known, supply chains are rather complex business systems fraught with nonlinear behavior of system variables. Simulation models are a powerful modeling methodology that can successfully handle such complex business systems. Simulation models not only handle complex business but also provide useful insights and pointers to manage them to achieve desired objective functions. A four level Supplier- Manufacturer- Distributor- Retailer System Dynamics (SD) model developed with Vensim software© to understand the effect of changes in inventory policies in meeting important objectives of typical retail supply chains.

As may be noted defining and tweaking an objective function is very critical in managing complex business systems to drive them towards the desired outcomes. In the current study we attempt to understand the effect of different inventory policies coupled with the forecast practices adopted by supply chain partners in a typical retail supply chain on meeting the common objectives of the supply chain as well as the individual supply chain partner's goals.

A System Dynamics model has already been developed and preliminary runs are made to validate the model. We use a combination of eliminating unfilled orders at the retailer and minimizing the inventory carrying costs at the various de-coupling points in the supply chain as our objective function to develop useful insights and takeaways. We present the results of such experimentation and the possible insights from such experimentations.

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Geo-Economics of Global Industrial Agricultural Development Models: Opportunities, Challenges, and Government Policies

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Abstract

The global nature of the agricultural industry has seen substantial modifications as a result of industrialization and commercialization. The present paper analyzes the global countries, UNO, World Bank, IMF, WTO, and MNCs, TNCs, philanthropic corporate industrial agricultural models and their nature and suggests policies for more profitable models for the globe. The results of global countries models show that USA-Industrial Agricultural, Canada-Value-added Production Industrial Agriculture, Mexico-Commercial Agriculture, Brazil-Integrated Farming and Low Carbon Farming, UK-Mechanized and Industrial agriculture models, Germany-Smart Farming, Switzerland-Organic Farming, Russia-Market oriented models, Sweden-Modern farming models, Australia-Conservation Farming, India-IFS Model, China-Intensive farming Models, South Africa-Dual agriculture economy, MNC's TNC's-Global Corporate Farming Models. World Bank: Global markets via value-chains originating in industrial agriculture, IMF: International partnership for sustainable development, WTO: "global partnership" Model, UNO: inclusive business models in Agriculture and Food systems for sustainability, UN ESCAP and Billgate: inclusive business models partnership in Sub-Saharan Africa and Southeast Asia. MNCs and TNCs function as tools in the context of industrial agriculture and advancing agricultural practices globally and potential benefits are increased efficiency, increased innovation, and increased market access. IMF (International Monetary Fund) and the World Bank are practiced cooperation, the World Trade Organization (WTO) to include cooperation with the UN system, OECD, and other international partners.

The study suggests adopting Russian contract farming, joint venture, corporate models which minimize the resource constraints, advanced technologies adoption, and linking global supply chains for small farms in Asia and Africa in particular and developing countries in general. The study suggests that global countries should play a crucial role in market shaping in agriculture. governments, private sectors, academia, civil societies partnership in locally, regionally, and globally important for food security sustainability and ecology. MNC's TNC's-

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Global Corporate Farming Models, transparency, accountability, and mandatory reporting ensure responsible corporate behavior.

Keywords: Globalization; industrial agriculture models; modernization; commercialization; opportunities; challenges; government policies

I. Introduction

The agricultural production of the globe has increased dramatically throughout the twentieth century, especially in its second half. In recent years, massive cultivation has not made much of a difference. Since its inception in the mid-20th century, industrial agriculture has been promoted to the public as a technological marvel. Its philosophy is its efficiency would enable food production to meet the demands of a rapidly growing global population, and its economies of scale would ensure profitable farming.

Industrial agriculture shares some similarities with its counterparts in other countries, but it also has distinct characteristics influenced by the country's geography, climate, and agricultural history. It involves large-scale farming operations that focus on the production of high-yield crops and livestock. Farms may cover extensive areas and use advanced machinery and technologies to maximize productivity. Industrialization comes from regular innovation of current technologies and also boost yields and increase resistance to drought, flood and climatic risks and mechanization is lessen labor-intensive tasks and increase efficiency. Management techniques are required to optimize resource use and lessen agricultural production greenhouse gas emissions.

Since prospering agriculture is regarded as the most important foundation for economic growth, particularly in less developed countries (LDCs), the only practical choice for them is to keep raising the productivity of agricultural land and labor. GOI implement the largest food distribution and public employment schemes in the world, as safety nets with enormous potential to eradicate India's large-scale undernourishment (Chakravarty, 1920). According to Pingali et al. (2017) and Pingali and Rosegrant (1995), commercialization happens when agricultural systems shift from subsistence and semi-subsistence-oriented agriculture to a production system centered on profit maximization. Households adjust their input decisions during commercialization, replacing non-trade inputs for bought inputs and shifting their crop preferences towards higher-value agriculture such as horticulture, livestock, poultry, and aquaculture (Pingali, 1997). Technical limitations that are important for producing healthy public policy attempts to create stable, secure, and sustainable livelihoods for those working in agriculture, going beyond only economic factors. Government policies may successfully assist and improve the agriculture industry by eliminating market and non-market inefficiencies (Milio, 2001, p. 622).

In order to address significant inter-regional disparities within countries it is necessary to connect small farms to urban food value chains effectively. But the challenges are modernizing systems and diversifying staple grain systems to address access, micronutrient deficiencies so that poverty, hunger, social and environmental SDG goals achieved (Abraham, 2020). Despite the worldwide goal of ending hunger by 2030, there is still a serious societal issue with hunger in the worldwide South (Fanzo et al., 2016). In the last two decades, SSA has paid attention to the utilization of modern agricultural technology, with the majority of governments increasingly relying on international partnerships to offer smallholder farmers subsidized mechanized agricultural services. The main claim is that incorporating technological innovations into smallholder agricultural systems will help to change the technical efficiency of crucial inputs to minimize labor and drudgery, intensify, and maximize production output for the benefit of rural communities generally (Ankrah Twumasi et al., 2020). The Green Revolution had beneficial effects on food security, yields of wheat and rice grew significantly, cutting food costs and increasing availability, and poverty decreased in many areas of India as a result of the increased revenue (Flood, J., 2010).

Dastagiri MB, 2017 policy advocacy is that in globalization modern era, the global supply chain model must be directly connecting producers with exporters and importers or consumers of importing countries. This is possible digitalization and single window processing. UN MDGs have focused on eradicating extreme poverty, hunger, and the food crisis pushed the hungry over the one billion mark. So new focus on agricultural development, which suggests the importance of industrial agriculture (as a supply source) in addressing food security (McMichael and Schneider 2011).

The present paper analyzes the world countries global Industrial agricultural models and their characters, advantages & disadvantages. The study analyzes the potential and challenges faced by smallholder farmers, large farmers in the context of agricultural commercialization. The study also analyzes UNO, FAO, World Bank, IMF, WTO and MNCs, TNCs, Philanthropic Institutes Industrial Agricultural Models. It also analyzes the MNCs, TNCs, Philanthropic Corporates industrial Agriculture Models and how these institutions are more successful. Finally, the study suggests strategies and policies for more agriculture profitable models of industrial models for the globe.

Objectives

1. To analyze the Global countries Industrial Agricultural Models, features, strategies, advantages, and disadvantages.
2. To analyze UNO, FAO, World Bank, IMF, WTO, MNCs, TNCs, Philanthropic Corporates industrial Agriculture Models, features advantages and disadvantages.
3. To analyse the potential and challenges faced by smallholder farmers, large farmers in the context of agricultural commercialization.
4. To analyze the comparative performance of different countries industrial agricultural models with MNCs and TNCs Models.
5. To suggest strategies and Policies for more profitable agriculture models of Industrial models for the globe.

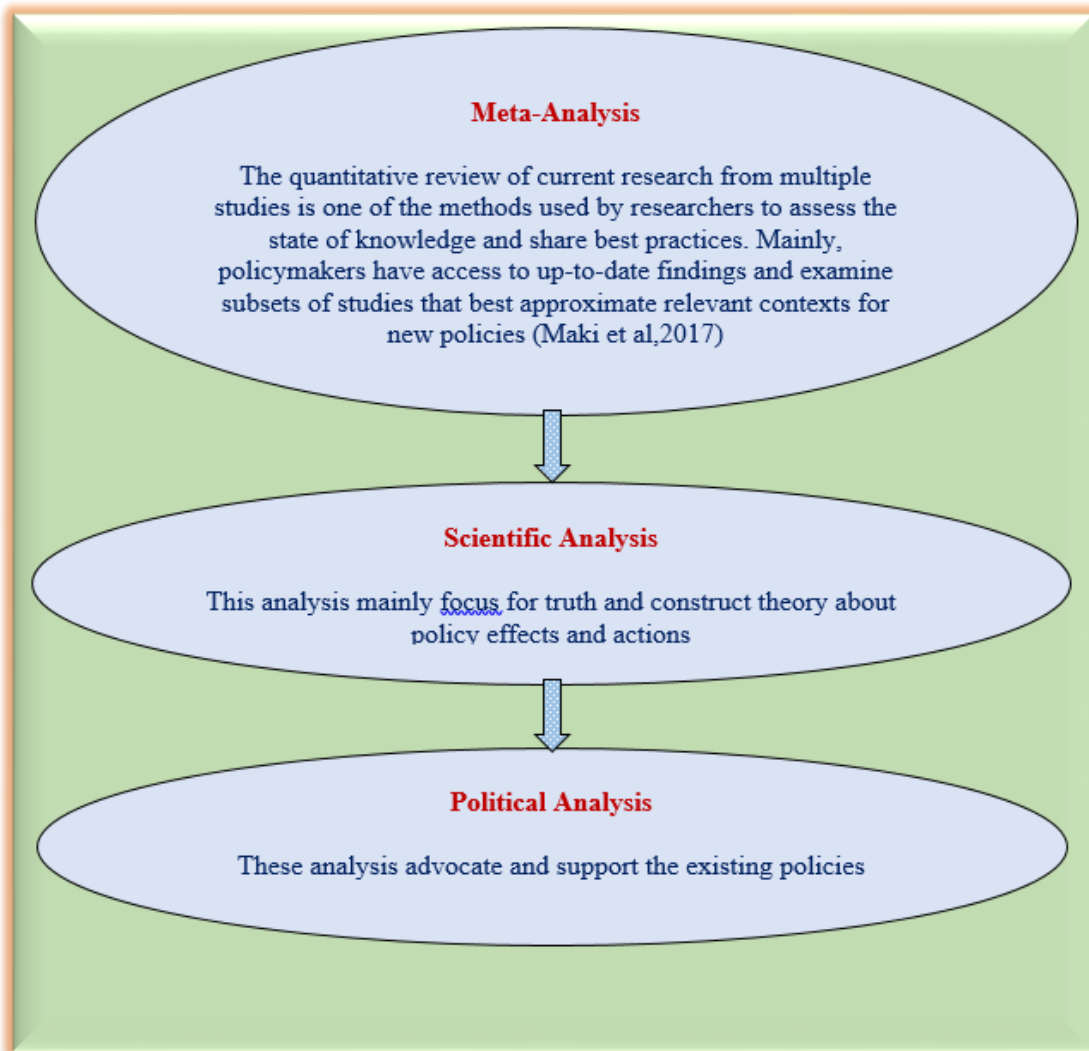
II. Research Methodology

The study uses scientific, explorative, perspective, vision-based geoeconomics of Global Agriculture Industrial models evaluation research. The review, synthesis, meta-analysis, perspectives, vision tools were employed to evaluate global agriculture industrial developmental models and their success, relevance, failures. Geoeconomic influence on UNO, FAO, IMF, World Bank, WTO, TNCs, and global countries developmental models were critically analyzed. Scientific and political policy approach employed to evaluate global industrial agricultural models trade, status, scenarios, progress and benefits to globalized world. The data on these models are collected from different countries research studies, models, reviews, websites, UNO, FAO, IMF, World Bank, WTO websites and reviews of the writers' studies. The study period is 1960 to 2022. Secondary data sources are the foundation of the entire investigation. The results were validated using the meta-analysis, scientific analysis, and political policy analysis. Finally, the study suggests the policy measures for global sustainable industrial models for future development.

Policy analysis: To find policy challenges with workable solutions are made possible by policy analysis (Cairney, 2020). To accomplish the objectives of the study: 1) meta-analysis, 2) scientific analysis, and 3) political analysis were used.

The global agricultural industrial policy investigation is done using meta-analysis which is the study of analysis on analysis. The scientific method of policy analysis concerned development of theory and truth about national policies around the world. The dominant policy arrived primarily from political analysis to promote and support the chosen policies.

Figure 1. Policy analysis used in the current study.



III. Results

Global Industrial Agricultural Model: Features, strategies, advantages & disadvantages, Policies

Industrial Agriculture

Industrial agriculture refers to the large-scale and intensive production of crops and animals. Industrial agriculture involves the application of modern technology, large-scale production methods, and efficient resource management to achieve high yields and meet the demands of a growing population. This method often involves using chemical fertilizers on crops and the routine, harmful administration of antibiotics to animals, even when they are not sick, to compensate for unsanitary conditions. Additionally, it may incorporate genetically modified crops, heavy pesticide use, and other practices that deplete the land, mistreat animals, and contribute to various forms of pollution. Over the years, the industry has undergone a process called "vertical integration," where small, diverse farms producing a variety of crops and livestock have been replaced by an industrialized system dominated by multinational

corporations. Consequently, these corporations enjoy the benefits, while farmers, growers, and their workers experience diminishing profits and an increase in health challenges associated with industrial practices.

Global Industrial Agricultural Models evaluation: Features, strategies, advantages, disadvantages, policies shown in Table 1. The results shows that USA- Industrial Agricultural, Canada- Value-added Production Industrial Agriculture, Mexico- Commercial Agriculture, Brazil- Integrated Farming and Low Carbon Farming, UK- Mechanized and Industrial agriculture models, Germany- Smart Farming (Digital Technologies), Switzerland- Organic Farming, Russia- Market oriented models, Sweden- Modern farming models, Australia- Conservation Farming, India- IFS Model, China- Intensive farming Models, South Africa- Dual agriculture economy, MNC's TNC's- Global Corporate Farming Models such as agribusiness model, vertical integration model, contract farming model, biotechnology and genetic modification model, sustainable agriculture model, global market expansion model are practiced. International cooperation for standards and technology transfer ensures a global commitment to sustainable agriculture. World Bank: Global markets via value-chains originating in industrial agriculture, IMF: International partnership for sustainable development, WTO: "global partnership" Model, UNO: inclusive business models in Agriculture and Food systems for sustainability, FAO- Global agricultural Models to ensure food security and sustainable development, UN ESCAP and Bill Gates: inclusive business models partnership in Sub-Saharan Africa and Southeast Asia.

Table 1. Global Industrial Agricultural Model: Features, strategies, advantages, disadvantages & policies.

Continent	Country	Successful Industrial Models	Futures/Strategies/disadvantage	Policies/suggestions
North America	USA	Industrial Agriculture Model	It is characterized by large-scale monoculture, extensive use of chemical fertilizers and pesticides, and the confinement of animals in CAFOs (confined animal feeding operations). The industrial farming approach also centers around a limited number of crops that are predominantly used as animal feed, biofuels, and ingredients for processed junk food. Disadvantages of industrial agriculture are Deforestation, Pest and weed resistance to chemicals, Soil degradation, Impact on natural habitats, Water pollution and Climate change etc.	Considering all the negative aspects of industrial farming, environmental activists advocate for more ethical and sustainable farming practices. But the complete transition from industrial agriculture to sustainable and regenerative agriculture will result in less food being produced. However, precision farming technologies have the potential to significantly lessen the negative effects of industrial agriculture. Thus, deliberate choices and government-imposed restrictions should weigh the pros and cons of industrial agriculture in order to help famine relief efforts while also considering how to preserve the environment for future generations.
	Canada	Value-added Production Industrial Agriculture	The value-added production models in the Canadian agriculture sector are constantly evolving as new technologies are developed and new markets emerge. Some of the factors that are driving the growth of value-added production in the Canadian agriculture sector: The rise of automation, The growth of new markets, The development of new technologies.	The Canadian agricultural policy framework for 2018–23 offers farmers a number of options for risk management. The projects aimed at industry-led R&D, innovation adoption, and inspection and control systems. The goal of improving the sector's long-term sustainability and competitiveness should continue to be the main focus of policy. The available quotas should rise and the price support for the

				<p>dairy, poultry, and egg industries should decrease in order to gradually phase out supply management for the commodities.</p> <p>A step in the right direction towards lowering agriculture's detrimental environmental externalities and increasing the industry's sustainability is the Healthy Environment and a Healthy Economy plan. To fulfill the policy's objectives, monitoring and impact assessments will be essential.</p>
	Mexico	Commercial Agriculture Industrial Model	<p>Mexico's commercial agriculture sector be considered a tool for implementing industrial agriculture practices.</p> <p>Here's how Mexico's commercial agriculture aligns with industrial agriculture: Modern Technology Adoption, Specialization and Large-Scale Production, Export Markets and Global Trade, Agribusiness Integration, High-Yield Varieties and Biotechnology, Protected Agriculture and Greenhouse Technology, Precision Agriculture Practices, Resource Management and Sustainability, Supply Chain Efficiency etc.</p> <p>While Mexico's commercial agriculture sector exhibits many characteristics of industrial agriculture, it's important to consider the potential challenges and trade-offs associated with this approach. Balancing increased production with sustainability, environmental impacts, and the well-being of rural communities remains a critical consideration.</p>	<p>In enhancing Mexico's commercial agriculture models, should prioritize sustainable practices and social equity. Encourage the adoption of agroecological methods and precision farming to optimize resource use and minimize environmental impact. Implement land tenure policies to support small-scale farmers and prevent land concentration. Establish regulations promoting fair labor practices, ensuring the well-being of agricultural workers. Incentivize the diversification of crops to enhance resilience and promote biodiversity. Facilitate access to credit and technology for small-scale farmers to bridge the technological divide. These policies aim to foster a resilient, equitable, and environmentally conscious commercial agriculture sector in Mexico.</p>
Latin America	Brazil	Integrated Farming and Low Carbon Farming	<p>Brazil has been a leader in developing intensive low-carbon farming models. These models aim to produce more food while reducing greenhouse gas emissions. Some of the most promising models include: Zero-tillage agriculture, Integrated crop-livestock-forestry systems, Conservation agriculture, Sustainable intensification etc. These practices have the potential to make Brazilian agriculture more sustainable and productive.</p>	<p>By developing and implementing low-carbon farming models, Brazil can reduce its environmental impact and become a global leader in sustainable agriculture. Brazil's Integrated Farming and Low Carbon Farming should prioritize agroecological practices, offering financial incentives for sustainable methods and carbon sequestration. Policies on water conservation, forest protection, and sustainable livestock practices are essential. Exploring carbon trading programs and promoting collaboration among government, research institutions, and the private sector will enhance the effectiveness of these initiatives.</p>
Europe	UK	Mechanized and Industrial	The UK's mechanized and commercial agriculture models	UK's mechanized and industrial agriculture models should focus

		agriculture models	<p>can be used as a tool for industrial agriculture.</p> <p>The UK's mechanized agriculture model can help to increase the productivity of farms. The commercial agriculture model can also help to increase productivity by allowing farms to specialize in the production of certain crops or livestock.</p> <p>However, the UK's mechanized and commercial agriculture models also have some potential drawbacks. These models can lead to environmental problems. They can also contribute to the decline of rural communities, as they often lead to the consolidation of farms and the loss of jobs.</p> <p>However, it is important to use these models responsibly and to minimize their environmental and social impacts.</p>	<p>on balancing efficiency with environmental stewardship. Implementing precision farming technologies can optimize resource use, reduce waste, and enhance productivity.</p> <p>Encouraging the adoption of smart machinery and robotics can further improve efficiency while minimizing environmental impact. Regular monitoring and enforcement of environmental standards will ensure responsible industrial agriculture practices, fostering a balance between productivity and ecological considerations.</p>
	Germany	Smart Farming (Digital Technologies)	<p>In recent years, there has been a growing interest in using digital technologies in agriculture. These technologies can help farmers to improve their efficiency, productivity, and sustainability. For example, digital technologies can be used to:</p> <ul style="list-style-type: none"> ✓ Monitor crop health and growth ✓ Optimize irrigation and fertilization ✓ Control pests and diseases ✓ Track livestock movement and health ✓ Manage farm finances <p>Digital technologies can be a valuable tool for small farms, as they can help them to compete with larger, more industrial farms.</p>	<p>Digital technologies also some challenges that small farms face in adopting digital technologies. These challenges include: Cost, technical expertise, data privacy etc. Despite these challenges, there are a number of ways that small farms can adopt digital technologies. These include:</p> <p>Working with partners: Seeking government support: By overcoming the challenges and taking advantage of the opportunities, small farms can use digital technologies to improve their efficiency, productivity, and sustainability.</p>
	Switzerland	Organic Farming	<p>These models are all based on the principles of sustainability and environmental protection. They offer a promising way to produce food that is healthy for people and the planet.</p> <p>Some of these models are biodynamic farming, integrated crop-livestock farming, permaculture, agroforestry, holistic management etc.</p>	<p>The Swiss government has a number of policies in place to support organic farming, such as subsidies for organic farmers and labeling requirements for organic products. These policies have helped to make organic food more affordable and accessible to consumers.</p> <p>As the demand for organic food continues to grow, it is likely that organic farming will become even more important in Switzerland. This is good news for the environment and for the health of Swiss consumers.</p>
	Russia	Market-oriented models	<p>One of the most common models is the contract farming model. In this model, a large agricultural enterprise contracts with a smaller farm to grow crops or raise livestock. The large enterprise provides the inputs, such as seeds, fertilizer, and machinery, and the smaller farm provides the</p>	<p>Some of the challenges that Russia's agricultural sector faces: international competition, labor shortages, Soil degradation, climate change etc.</p> <p>Despite these challenges, Russia has the potential to become a major agricultural power. The country has a large amount of</p>

			<p>land and labor. The profits are then shared between the two parties.</p> <p>Another common model is the joint venture model. In this model, a Russian agricultural enterprise partners with a foreign company to produce food. The foreign company provides the capital and technology, and the Russian company provides the land and labor. The profits are then shared between the two partners.</p> <p>A third model is the corporate farming model. In this model, a large corporation owns and operates a number of farms. The corporation is responsible for all aspects of production, from the purchase of inputs to the sale of outputs.</p> <p>Each of these models has its own advantages and disadvantages. Contract farming can be a way for smaller farms to access the resources and expertise of larger enterprises. Joint ventures can help to bring in foreign investment and technology. Corporate farming can achieve economies of scale and efficiency.</p>	<p>arable land and a favorable climate for many crops. With the right investment and policies, Russia can meet its food security needs and become a major exporter of agricultural products. Russia's joint venture and corporate agriculture models, should focus on fostering innovation, efficiency, and sustainability. Implement transparent land tenure policies to attract investments while safeguarding the rights of small-scale farmers. Provide incentives for the adoption of modern farming practices, including precision agriculture and advanced machinery. Establish regulations promoting sustainable water use and soil conservation to mitigate environmental impact. Encourage corporate responsibility through reporting standards and certification programs. Support research and development initiatives to drive innovation and enhance the competitiveness of the agricultural sector. These policies aim to create a conducive environment for joint ventures and corporate entities, ensuring sustainable agricultural practices and economic growth.</p>
	Sweden	Modern farming	<p>Sweden has a long history of agricultural innovation, and its modern farming models are some of the most advanced in the world. These models are based on a number of principles, including: sustainability, efficiency and innovation. These principles have helped Swedish agriculture to become one of the most productive in the world. In fact, Sweden is a net exporter of agricultural products, and its farmers are able to produce enough food to feed the country's population and export the surplus. Some of the specific modern farming models used in Sweden: precision agriculture, integrated crop-livestock systems, cover cropping, zero-tillage agriculture, sustainable intensification etc.</p>	<p>Swedish modern farming models can be used to improve the productivity and sustainability of agriculture around the world. However, the nation's example should refute the widely held belief that increasing production at any cost is the only way to feed the globe in 2050.</p>
Australia		Conservation Farming	<p>Industrial agriculture in Australia influenced by the country's geography, climate, and agricultural history. Australia's agricultural sector is diverse and plays a significant role in the nation's economy, contributing to both domestic and international markets. Here are some key features of industrial agriculture in Australia:</p>	<p>A complicated interaction between legislation, economics, science, and farming is revealed in the Australian narrative of farmer innovation in California. The establishment of Rural Research and Development Corporations in the middle of the 1980s was a significant policy development. These companies guaranteed that research was</p>

			<p>Large-scale Farming, Monoculture and Specialization, Use of Technology, Intensive Livestock Production: It includes Cattle, poultry, and pigs are raised in high-density operations to meet the demand for meat products. Chemical Inputs: Export-oriented: Industrial agriculture is export-oriented with a significant proportion of its agricultural products being sold in international markets. Major exports include wheat, barley, beef, wool, and dairy products. Sustainable Practices: Water Management: Regional Differences: Overall, industrial agriculture in Australia has undergone significant changes over the years, and there is an ongoing shift towards more sustainable and efficient practices to address environmental concerns and ensure the industry's long-term viability.</p>	<p>pertinent to farmers' needs and provided a voice to farmers. The Australian stance on free trade is equally significant, as it forces farmers to compete on global commodity markets with no government assistance. The constant quest for efficiency has an impact on agricultural enterprises, and CA takes numerous environmental and economic imperatives into account. It's unlikely that these farmer associations could have grown to such a degree if government assistance had continued. New opportunities have been generated by the availability of new technology, such as machinery, herbicides, varieties, and most recently, precision agriculture. Farmers have demonstrated proficiency in incorporating these technologies into their agricultural systems. Finally, it is impossible to overstate the resourcefulness and perseverance of Australian farmers in the face of hardship.</p>
Asia	India	Mixed and multiple agriculture (IFS Model)	<p>In recent years, there has been a growing shift towards industrial agricultural models in India. These models are characterized by the use of large-scale mechanization, irrigation, and chemical inputs. There are a number of factors that have contributed to the rise of industrial agriculture in India. These include: the increasing demand for food as the population grows, the government's focus on increasing agricultural productivity, the availability of cheap labor, the development of new technologies, such as genetically modified crops. Industrial agriculture has had a number of positive impacts on the Indian agricultural sector. These include: increased yields, which have helped to reduce food insecurity, increased incomes for farmers, reduced drudgery for farmers, improved food safety. Some of the industrial agricultural models: Integrated farming systems Models: IFS involves the integration of various agricultural activities on a single farm to achieve multiple benefits. While industrial agriculture often focuses on maximizing productivity, IFS aligns well with this goal by optimizing resource use, diversifying income sources, and promoting environmental sustainability. Contract farming, precision farming model and</p>	<p>Mixed and conservative agriculture offers a fresh approach. Sustainable productivity increase currently requires integrating considerations about the environment, soil quality, resource conservation, and productivity. In terms of knowledge base, developing and promoting hybrid systems will be extremely challenging. The ability to collaborate closely with farmers and other stakeholders, and improved knowledge and information sharing. By reducing cultivation costs and increasing agricultural productivity, sustainability, and competitiveness, conservation and mixed agriculture can stop and even reverse the negative trend of resource degradation. The new goal must be "conserving resources - enhancing productivity."</p>

			mixed farming are some other examples	
	China	Intensive farming Models	<p>China has been actively employing intensive cropping models as a tool for its industrial agriculture efforts to enhance agricultural productivity and food security. Intensive cropping models play a significant role in achieving these goals. China's intensive cropping models are characterized by the following features: multiple cropping, High-yielding varieties, intensive use of inputs.</p> <p>The double-rice cropping system: This is the most common intensive cropping system in China. It involves growing two crops of rice in the same field each year.</p> <p>The fish-rice cropping system: This system involves raising fish in ponds or flooded fields along with rice. The fish help to control pests and diseases, and they also provide an additional source of income for farmers etc.</p>	<p>In intensive agriculture, agricultural diversity is suggested as a way to attain sustainability and food security. China, a world leader in agricultural production, may be a valuable resource for understanding how to support a sustainable global food system transition by including diversification into key policies. China's intensive agriculture models should prioritize sustainable intensification and environmental conservation. Invest in research and development for high-yield, low-input crop varieties suitable for intensive systems. Foster collaboration between the public and private sectors to promote innovation and technology transfer, driving productivity while minimizing environmental impact. These policies aim to balance the productivity gains of intensive agriculture with long-term sustainability and environmental considerations.</p>
Africa	South Africa	Dual agriculture economy	<p>South Africa's dual agricultural economy is characterized by a small number of large-scale commercial farms that produce the majority of the country's food, and a large number of small-scale subsistence farms that produce food for their own consumption. This dual system has its roots in the country's colonial history, when land was expropriated from black farmers and given to white settlers.</p> <p>Examples of how the dual agricultural economy in South Africa can be used as a tool for industrial agriculture: contract farming, joint ventures, land reform, sustainable agriculture</p>	<p>A considerable number of subsistence (communal) farms coexist with a developed commercial sector in South Africa's highly dualistic agricultural system. Field crops, cattle, and horticulture are the three primary sectors of agriculture, which is highly diversified. However, weather conditions can cause significant annual changes in productivity. Over the last ten years, fruit production has grown at the fastest rate possible, with a significant portion of its produce being exported, mostly to Europe.</p> <p>The commercial agriculture industry responded favorably to the attempts at deregulation and policy changes. Commercial agriculture is under significant financial and economic strain, though, and like other industries, farmers must adjust their investment and production choices in response to changes in the market and broader economic trends. It is important to take into account these market forces in light of land reform and Black Economic Empowerment (BEE).</p>
Corporates (MNCs and TNCs) industrial Agriculture	Global countries	Global Corporate Farming Models	<p>Multinational Corporations (MNCs) and Transnational Corporations (TNCs) play a significant role in shaping the landscape of industrial agriculture. They often</p>	<p>Multinational and transnational corporations in industrial agriculture should prioritize environmental sustainability, biodiversity conservation, and</p>

<p>Models</p> <p>The Bill & Melinda Gates Foundation</p> <p>Ford Foundation</p> <p>Rockefeller</p>		<p>Small Scale & Industrial agricultural models</p> <p>Agroecology and Social Justice for Food System Transformation</p> <p>Food & Prosperity</p>	<p>act as tools for advancing and influencing agricultural practices globally. Here are some models that illustrate how MNCs and TNCs function as tools in the context of industrial agriculture: agribusiness model, vertical integration model, contract farming model, biotechnology and genetic modification model, sustainable agriculture model, global market expansion model.</p> <p>These models showcase how MNCs and TNCs operate as tools in industrial agriculture, influencing everything from the supply chain and production methods to research and market expansion. Each model has its own set of advantages and challenges, and their impact on local and global agriculture varies based on factors like corporate strategies, government regulations, and consumer preferences.</p>	<p>social responsibility. Regulations on agrochemical use and incentives for sustainable farming practices can mitigate environmental impact. Preserving natural habitats, promoting crop diversity, and efficient water use should be key goals. Land use planning, fair labor practices, and community engagement can address social equity. Climate change mitigation through carbon sequestration and adaptation strategies is crucial. Transparency, accountability, and mandatory reporting ensure responsible corporate behavior. Supporting research for sustainable technologies and facilitating knowledge transfer are essential. Market incentives like eco-labeling and subsidies for sustainable practices encourage responsible corporate behavior. International cooperation for standards and technology transfer ensures a global commitment to sustainable agriculture. These policies aim to balance economic interests with environmental and social well-being.</p> <p>The debate over the role of corporates in industrial agriculture is likely to continue for many years to come.</p>
<p>UNO, FAO, World Bank, IMF, WTO, and Philanthropic Institutes</p> <p>Industrial Agricultural Models</p>	<p>World Bank</p> <p>IMF</p> <p>WTO</p>	<p>Global markets value chains industrial agriculture.</p> <p>International partnership for sustainable development</p> <p>WTO: "global partnership" market centric liberalizing models.</p>	<p>The World Bank's new 'agriculture for development' is to improve small-farmer productivity with new inputs, and their links into global markets value-chains originating in industrial agriculture.</p> <p>IMF within its mandate is dedicated to the international partnership for sustainable development.</p> <p>WTO: "global partnership" idea is codified in the WTO mission. The market-centric organizing Principle corporate food regime is codified in WTO protocols of 1995.50. WTO trade rules via Agreement on Agriculture, stabilized competitive 'dumping' of surplus foods by Europe and the US. This succeeded by liberalizing agricultural trade via the opening of Southern markets to Northern agri-exports. IAASTD report resonates that 'food sovereignty' politics, demanding small-farmer rights to develop bio-regionally specific agro-ecological methods and provision for local, rather than global markets.</p>	<p>Global Countries play a crucial role in market shaping in agriculture. Governments, Private sectors, Academia, civil societies partnership in locally, regionally, and globally important for food security sustainability and ecology</p> <p>WTO must focus policies on "global partnership".</p> <p>WTO mandate expanded over time to include cooperation with the UN system, OECD, and other international partners.</p> <p>International Monetary Fund (IMF) and the World Bank are specifically recommended for cooperation.</p>

	UNO	Inclusive business models in Agriculture and Food systems for sustainability & Ecology	<p>The United Nations (UN) plays a multifaceted role in shaping industrial agriculture models, but its approach differs from solely promoting them. Instead, the UN emphasizes sustainable development goals (SDGs), particularly SDG 2: Zero Hunger, advocating for a more holistic approach that considers not just production but also environmental and social impacts.</p> <p>The UN facilitates collaboration between governments, international organizations, NGOs, and the private sector to achieve sustainable development goals.</p> <p>The UN encourages local food production, diversifying crops, and promoting community-supported agriculture to create more resilient and equitable food systems.</p> <p>Supporting small-scale farmers: The UN recognizes the importance of empowering small-scale farmers through initiatives like providing resources, training, and market access.</p>	<p>Advocate for stronger governance and regulations: Push for national and international policies that incentivize sustainable practices, protect the environment and labor rights, and hold corporations accountable for their actions.</p> <p>Facilitate access to resources and financing: Support initiatives that provide small-scale farmers with access to land, water, seeds, and financial resources to adopt sustainable practices and improve their livelihoods.</p>
	UN ESCAP and Bill Gates	Inclusive business models partnership in Sub-Saharan Africa and Southeast Asia	<p>UN, ESCAP, and Bill Gates Foundations inclusive business models partnership in Sub-Saharan Africa and Southeast Asia for food security and well fare of the small farmers and poor consumers.</p> <p>Bill Gates Foundation and Private sectors participation for improvement of Food security in Global south.</p> <p>Governments, Private sectors, Academia, civil societies partnership in locally, regionally, and globally important for food security sustainability and ecology.</p>	<p>Strengthen monitoring and evaluation mechanisms: Develop robust systems to track the progress of UN initiatives and assess their effectiveness in achieving sustainable development goals.</p> <p>By implementing these recommendations and continuously adapting its approach, the UN can play a more significant role in shaping a sustainable and equitable future for global agriculture.</p>
	FAO	Global agricultural Models alongside efforts to ensure food security and sustainable development.	<p>FAO of the United Nations plays a crucial role in shaping global agricultural practices. While it doesn't solely promote industrial agricultural models, its initiatives often incorporate elements of these models alongside efforts to ensure food security and sustainable development.</p> <p>The FAO helps farmers connect to broader markets and participate in global value chains, potentially increasing their incomes and access to resources.</p>	<p>FAO's efforts to improve food production and rural development are valuable, a more nuanced approach is crucial to address the drawbacks of industrial agriculture.</p> <p>FAO's initiatives often involve collaborations with various stakeholders, including governments, private companies, and NGOs.</p>

IV. Successful Framework Models of Countries Adopting Industrial Agriculture Models

North America

USA

The majority of farms in the U.S. were diversified, which means they produced a range of crops and animal species alongside one another on the same farm in complimentary ways. Currently, industrial agriculture holds the predominant position in the United States' food production system. It is characterized by large-scale monoculture, extensive use of chemical fertilizers and pesticides, and the confinement of animals in CAFOs (confined animal feeding operations).

The industrial agriculture model is characterized by large-scale, monoculture production, Mechanization and automation, Use of synthetic fertilizers and pesticides, and government subsidies. However, it has also had a number of negative impacts, including: Environmental degradation, Public health concerns, Economic inequality.

Some Framework Industrial Agriculture Models

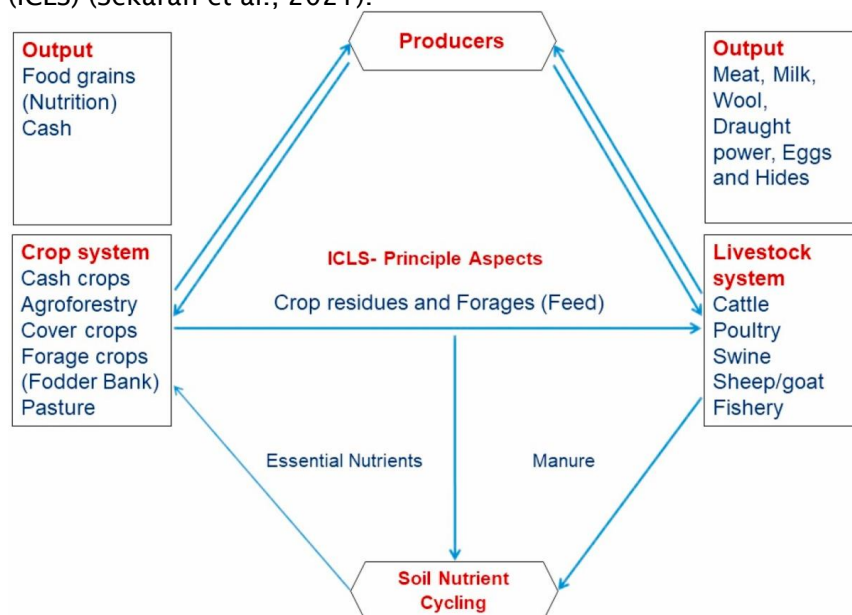
The Corn-Soybean Complex

The corn-soybean complex is a system of interrelated industries that produce, process, and market corn and soybeans. The corn-soybean complex is a major driver of industrial agriculture in the USA, and it has a significant impact on the environment, economy, and public health.

Integrated Crop-Livestock Systems (ICLS)

The output of one land unit is used as an input for another portion of the system, increasing the overall efficiency of the farm and productivity of both the crop and livestock production components, thus the total output from the ICLS is higher than the sum of its parts. At the field level, the ICLS aims for a closed nutrient cycle in which cropland produces a variety of fodders that are fed by livestock, while dung from grazing animals is used for nutrients and supplies organic matter to improve soil fertility. It covers crops, beef cattle and dairy cows, buffalo, poultry, sheep, and goats are typically used in various forms of ICLS (Sekaran et al., 2021).

Figure 2. Principle aspects of the integrated crop-livestock system (ICLS) (Sekaran et al., 2021).



Canada

The value-added production models in the Canadian agriculture sector are constantly evolving as new technologies are developed and new markets emerge. It is important for businesses in the agriculture sector to stay up to date on these changes in order to remain competitive. Some of the factors that are driving the growth of value-added production: The rise of automation, The growth of new markets: The growth of new markets, such as China and India, is creating new opportunities for Canadian agricultural producers to export their products. The development of new technologies,

Value-Added Exports

The fundamental structure of value-added exports is shown in Figure 3. The value of value-added exports, as demonstrated in this example, is equal to the gross export value less the value of imported intermediate inputs needed to produce the exported items ($\$400 = \$600 - \$200$). These imported inputs must take into account both the industry producing the exports and the upstream industries contributing inputs to the exporting sector's consumption of imports.

Figure 3. Framework of value-added exports. (Source: Ghanem and Huang, 2014)

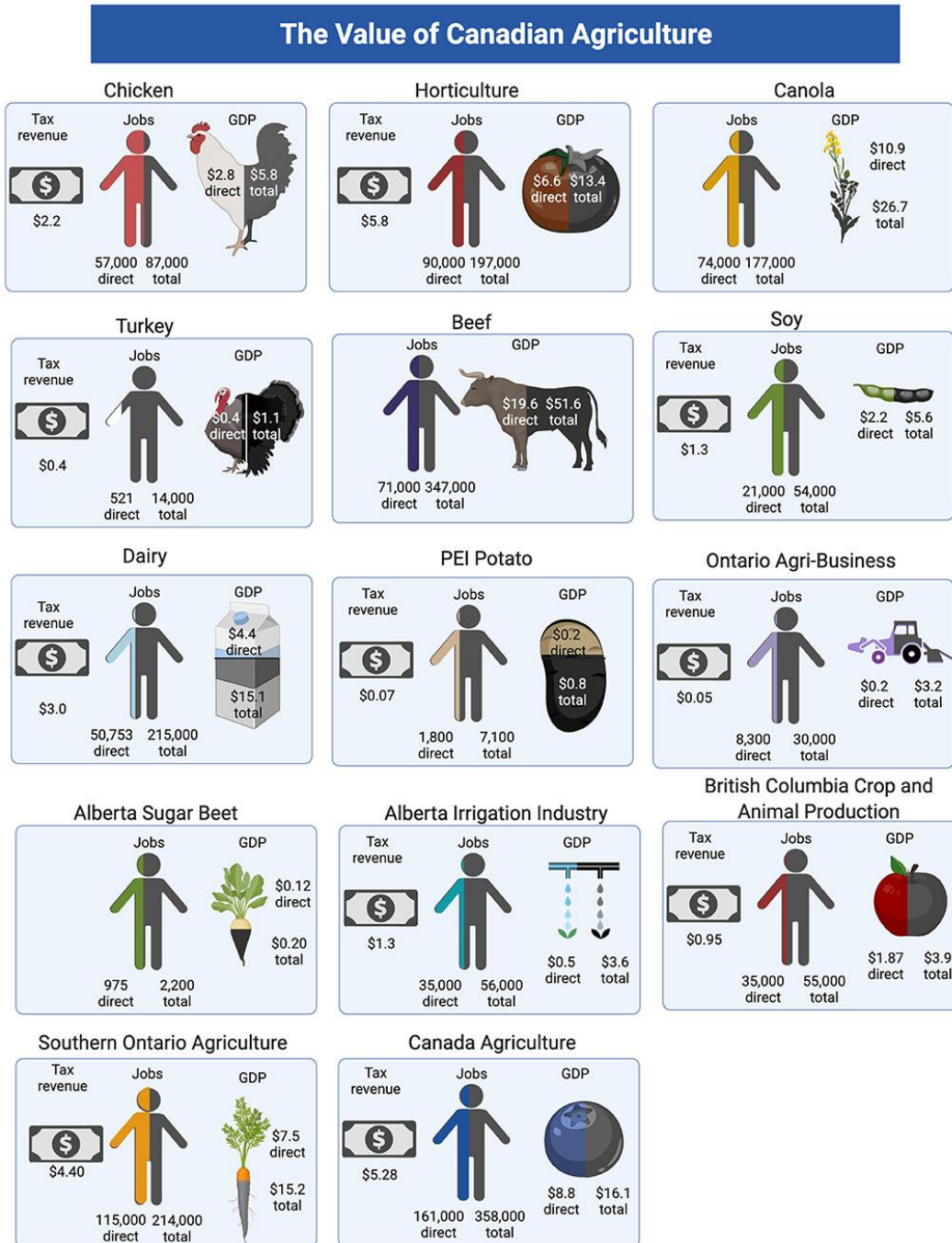


The Value of Canadian Agriculture

There were significant discrepancies between a sector's direct contributions and its overall impact, including its indirect and induced effects. The distribution of affects within industries varied by region (Figure 4). For beef, direct effects made up between a quarter and a half of the overall GDP and employment, but indirect effects, which were primarily a result of industrial assistance from other non-agricultural sectors, made up the next greatest part. Western provinces experienced greater direct effects. Because the direct GDP of beef only made up a third of the GDP of beef in eastern Canada and only made up half of the GDP in Alberta, it is vital to take the indirect and induced effects into account.

The economic impact of Canadian agriculture by sector and location. The direct and total (direct, indirect, and induced) economic impacts on GDP and employment from 15 input-output analyses of Canadian agricultural industries are shown in this graph. The total direct, indirect, and induced value added to the Canadian economy by that sector is expressed as the sector's gross domestic product (GDP) in billions of Canadian dollars. Employment in FTE are the total number of full-time equivalent (FTE) employment supported annually by that sector, whether they be direct, indirect, or induced. The total amount of taxes that sector has paid to local, provincial, and federal governments is expressed in billions of Canadian dollars. GDP and job numbers are derived from 15 articles using data from various years and computations using various multipliers; sums may not add up across papers.

Figure 4. The value of Canadian agriculture. (Source: Windfeld & Lhermie, 2022)



Mexico

Mexico's commercial agriculture sector has undergone significant changes over the years, incorporating elements of industrial agriculture to enhance productivity and economic growth. Mexico's commercial agriculture is often geared towards export markets, producing crops that are in demand internationally. Here's how commercial agriculture aligns with industrial agriculture: Modern Technology Adoption, Specialization and Large-Scale Production, Export Markets and Global Trade, Agribusiness Integration, High-Yield Varieties and Biotechnology,

Protected Agriculture and Greenhouse Technology, Precision Agriculture Practices, Research and Innovation, Resource Management and Sustainability, Supply Chain Efficiency integrated into global supply chains, Skill Development and Training.

While Mexico's commercial agriculture sector exhibits many characteristics of industrial agriculture, it's important to consider the potential challenges and trade-offs associated with this approach. Balancing increased production with sustainability, environmental impacts, and the well-being of rural communities remains a critical consideration.

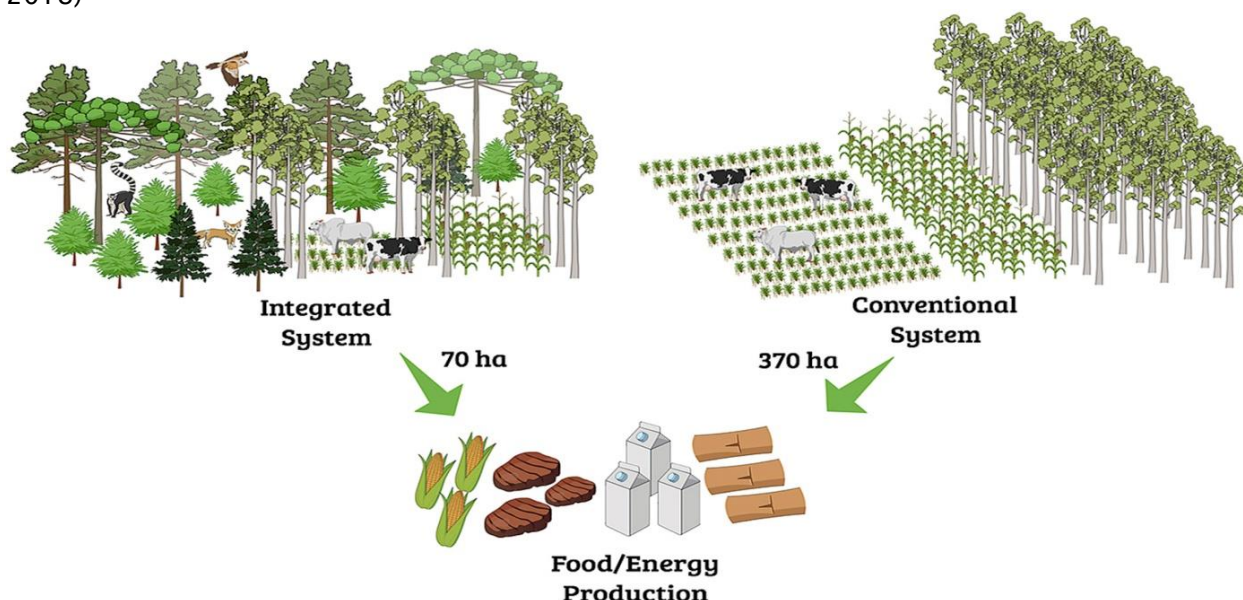
Brazil-Integrated Farming

Brazil has been a leader in developing intensive low-carbon farming models. These models aim to produce more food while reducing greenhouse gas emissions. Some of the most promising models include:

Zero-tillage agriculture: This system involves not disturbing the soil after harvest, which helps to keep carbon locked in the ground.

Integrated crop-livestock-forestry systems: These systems combine crops, livestock, and trees on the same land, which can help to improve soil health and reduce erosion.

Figure 5. Integrated crop-livestock-forestry systems in Brazil. (Source: Marcela et al., 2018)



Integrated crop-livestock-forestry systems in Brazil

One of the most recent agricultural innovations in Brazil is the crop-livestock-forest (CLFi) and crop-livestock (CLi) systems, which are in line with the ideals of cleaner production. Over a predetermined time period, such integrated systems can produce at least three different sorts of products from the same piece of land. **Conservation agriculture:** This system involves a set of practices that help to protect the soil, such as mulching and cover cropping. **Sustainable intensification:** This approach aims to increase yields while reducing the environmental impact of agriculture.

Europe

United Kingdom

It is important to note that there is no single "industrial agriculture model" in the UK. There is a great deal of variation in the way that industrial farms operate, depending on the crop they grow, the region they are located in, and the market they are selling to. However, the key features listed above are common to most industrial farms in the UK.

Here are some specific examples of industrial agriculture in the UK:

Cereal production. Cereals are the most important crop in the UK, and they are grown on a large scale. The most common cereals grown in the UK are wheat, barley, oats, and maize.

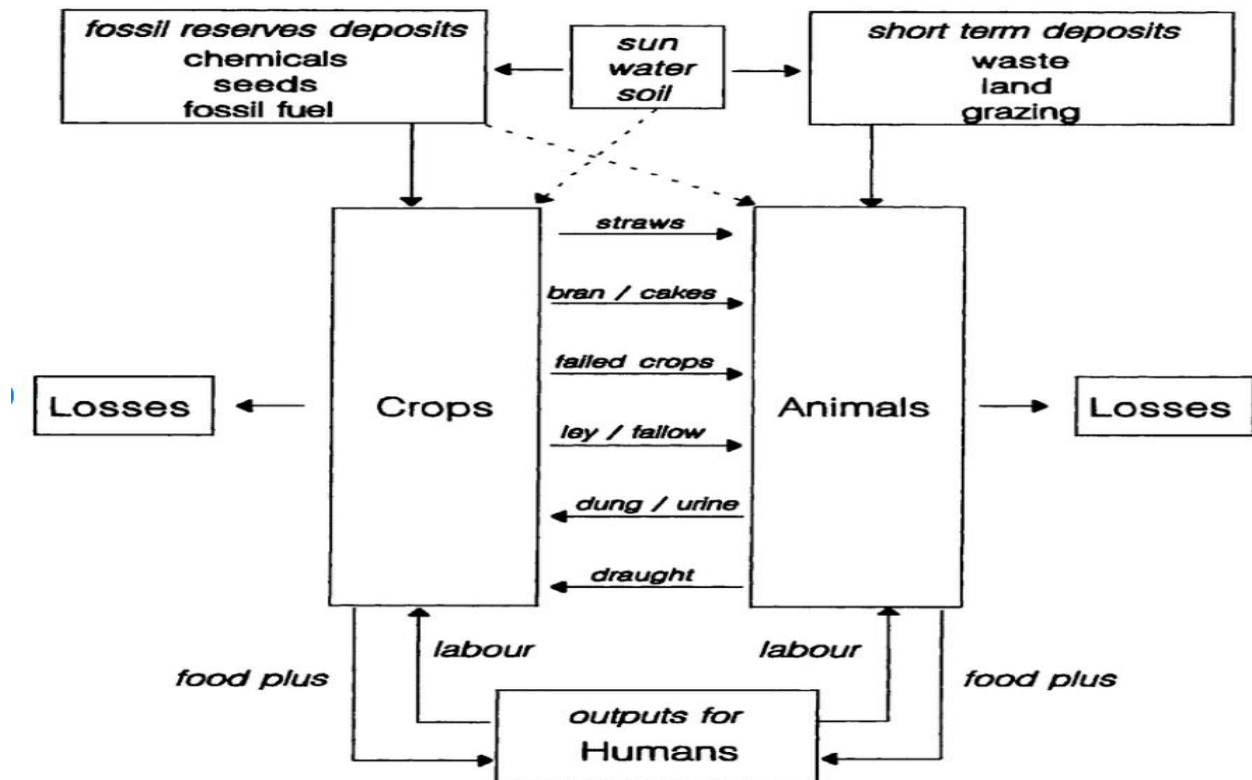
Dairy production. Dairy production is a major industry in the UK, and it is dominated by a small number of large, industrial farms. The most common dairy products produced in the UK are milk, cheese, and butter.

Livestock production. Livestock production is another major industry in the UK, and it is also dominated by a small number of large, industrial farms. The most common livestock raised in the UK are cattle, pigs, and poultry.

The cropping system

The cropping system includes the production of crops, such as wheat, potatoes, and barley. The system also includes the use of fertilizers, pesticides, and other inputs.

Figure 6. Livestock system diagrammatic model (Schiere et al., 2002).



The livestock system (Netherland)

This model shows the different components of the livestock system, which is another important part of industrial agriculture in the UK. The livestock system includes the production of livestock, such as pigs, poultry, and cattle. The livestock system also includes the use of feed, water, and other inputs.

The central box of the top row depicts external resources like solar energy, fertility/nutrient deposits, and rainfall. From there, the resources either flow directly to the crop system or to a short-term deposit on the right, which represents biomass in forests, byways, and grazing areas, and long-term stocks on the left, which represents fossil reserves from which "industrial" inputs like "improved" seeds and fertilizers are also manufactured. Right-hand livestock subsystem "feeds" primarily on recent biomass deposits. The crop sector "feeds" on solar energy, the intrinsic fertility of the land, long-term deposits, and/or short-term reserves that indirectly supply animals with energy and nutrients. To show that animals can "feed" on inputs of fossil fuels through medications, steel tools, etc., the crossed broken lines are shown. Further food sources for livestock from cropping include crop residues, failed crops, and the creation of fodder from leys, or planted fallow areas (Schiere et al., 2002).

UK- Mechanized and commercial agriculture

The UK's mechanized and commercial agriculture models can be used as a tool for industrial agriculture. Industrial agriculture is a type of agriculture that focuses on producing large quantities of food at a low cost. It is often characterized by the use of large-scale machinery, chemical fertilizers, and pesticides.

These models can lead to environmental problems, such as soil erosion and water pollution. They can also contribute to the decline of rural communities, as they often lead to the consolidation of farms and the loss of jobs. Some of the benefits of using the UK's mechanized and commercial agriculture models for industrial agriculture: Increased productivity, Specialization, Reduced costs, Improved food safety.

Here are some of the potential drawbacks of using the UK's mechanized and commercial agriculture models for industrial agriculture: Environmental impacts, Social impacts, Food security.

Germany

Germany farms are often family-owned and operated, and they play an important role in the German economy and culture. In recent years, there has been a growing interest in using digital technologies in agriculture. These technologies can help farmers to improve their efficiency, productivity, and sustainability. Digital technologies can be a valuable tool for small farms, as they can help them to compete with larger, more industrial farms. However, there are also some challenges that small farms face in adopting digital technologies. These challenges include Digital technologies cost, Technical expertise, Data privacy, Working with partners, Seeking government support, Investing in training. By overcoming the challenges and taking advantage of the opportunities, small farms can use digital technologies to improve their efficiency, productivity, and sustainability.

Some specific examples of how digital technologies are being used in German small farming:

Precision agriculture: Remote sensing: Robotics: Robotics is being used to automate tasks such as milking cows, harvesting crops, and weeding fields. This can help to reduce labor costs and improve efficiency.

Artificial intelligence (AI): AI is being used to develop decision-support tools that can help farmers to make better decisions about crop management, livestock breeding, and other aspects of farming.

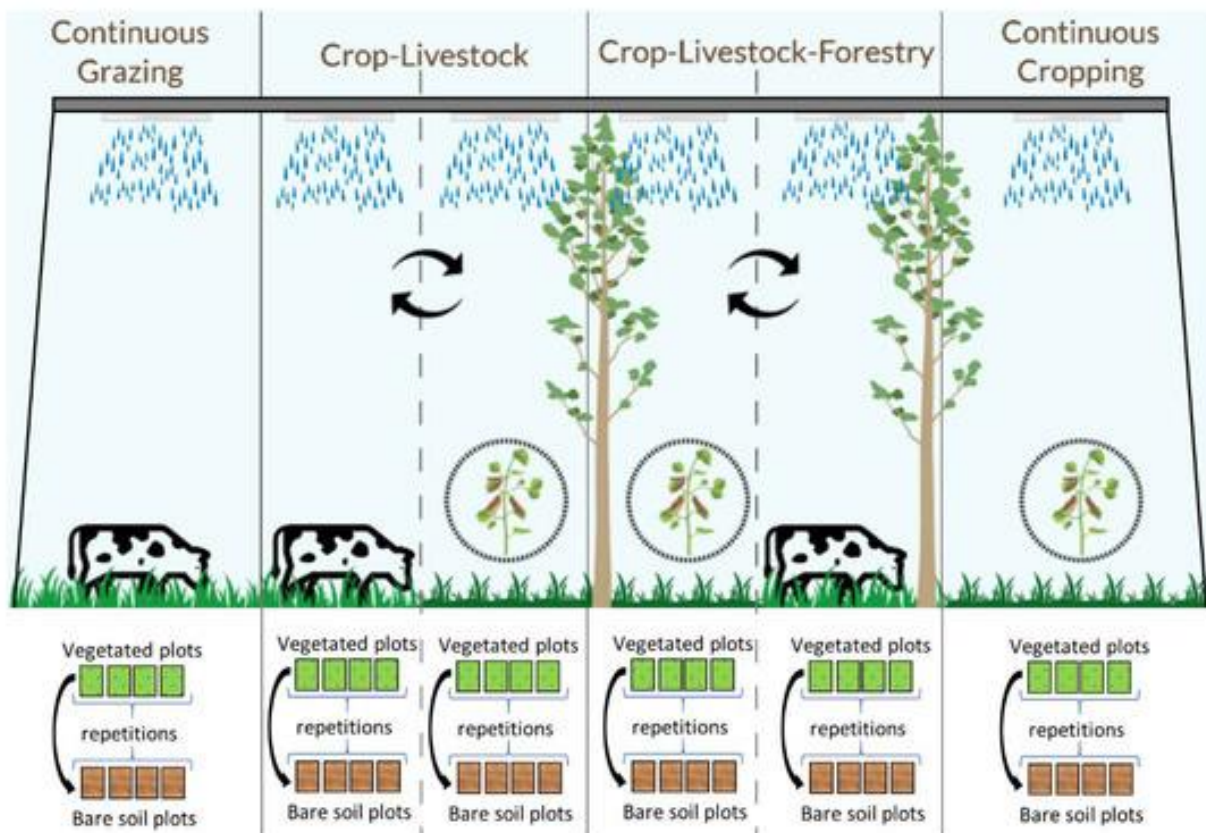
Switzerland

Switzerland has a long history of organic farming, and it is one of the leading countries in the world in terms of the percentage of land under organic cultivation. In 2020, 13.8% of agricultural land in Switzerland was organic, making it the 6th highest country in the world. The Swiss government has a number of policies in place to support organic farming, such as subsidies for organic farmers and labeling requirements for organic products. These policies have helped to make organic food more affordable and accessible to consumers.

Biodynamic farming: This approach to organic farming is based on the principles of Rudolf Steiner, who believed that plants, animals, and humans are all part of a interconnected web of life. Biodynamic farmers use a variety of practices to improve soil health, such as composting and crop rotation. They also use natural pesticides and fertilizers.

Integrated crop-livestock farming: This model combines crops and livestock production on the same farm. This can help to improve soil health and reduce the need for external inputs, such as fertilizers and pesticides.

Figure 7. Integrated crop-livestock farming in Switzerland. Four agricultural systems for water infiltration and soil loss: continuous grazing, crop-livestock integration, crop-livestock-forestry integration. (Source: Sone et al., 2019)



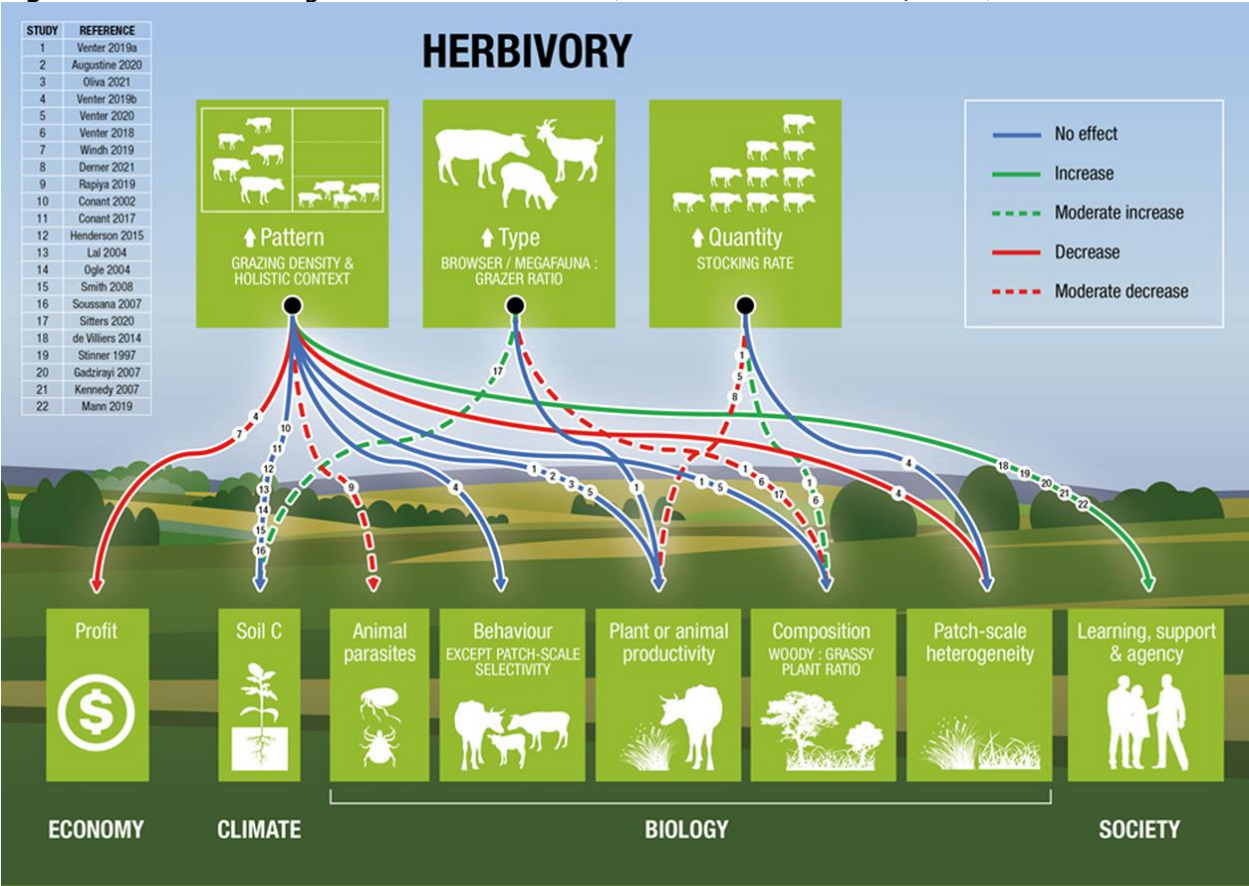
Integrated crop-livestock farming in Switzerland. Four agricultural systems for water infiltration and soil loss, continuous grazing, crop-livestock integration, crop-livestock-forestry integration.

Permaculture: This approach to agriculture is based on the principles of sustainability and regeneration. Permaculture farmers design their farms to mimic natural ecosystems and to provide food, water, and shelter for people and animals.

Agroforestry: This model combines trees and crops on the same farm. This can help to improve soil health, provide shade for crops, and attract beneficial insects.

Holistic management: This approach to agriculture is based on the principles of holistic thinking and systems thinking. Holistic management farmers manage their farms as a whole system, considering the interactions between all the components of the system.

Figure 8. Holistic management in Switzerland. (Source: Hawkins et al., 2022)



Holistic management in Switzerland

According to claims, holistic management (HM) can improve soil organic carbon and plant and animal output in all environments and ecosystems.

These are just a few of the organic farming models in Switzerland. These models are all based on the principles of sustainability and environmental protection. They offer a promising way to produce food that is healthy for people and the planet.

Russia

Russia's agricultural sector has undergone a significant transformation in recent years, with a shift from a centrally planned system to a market-oriented one. This has led to the development of a number of different models for industrial agriculture in Russia. One of the most common models is the contract farming model. In this model, a large agricultural enterprise contracts with a smaller farm to grow crops or raise livestock. The large enterprise provides the inputs, such as seeds, fertilizer, and machinery, and the smaller farm provides the land and labor. The profits are then shared between the two parties. Another common model is the joint venture model. In this model, a Russian agricultural enterprise partners with a foreign company to produce food. The foreign company provides the capital and technology, and the Russian company provides the land and labor. The profits are then shared between the two partners. A third model is the corporate farming model. In this model, a large corporation owns and operates a number of farms. The corporation is responsible for all aspects of production, from the purchase of inputs to the sale of outputs.

Each of these models has its own advantages and disadvantages. Contract farming can be a way for smaller farms to access the resources and expertise of larger enterprises. Joint ventures can help to bring in foreign investment and technology. Corporate farming can achieve economies of scale and efficiency. In addition to these models, there are a number of other trends in Russian agriculture. These include the increasing use of technology, the growth of organic farming, the development of agritourism. These trends are helping to make Russian agriculture more competitive and sustainable.

Here are some of the challenges that Russia's agricultural sector faces: Climate change, Soil degradation, Labor shortages, International competition. Russia faces increasing competition from other countries in the global agricultural market. Despite these challenges, Russia has the potential to become a major agricultural power. The country has a large amount of arable land and a favorable climate for many crops. With the right investment and policies, Russia can meet its food security needs and become a major exporter of agricultural products.

Sweden

Sweden has a long history of agricultural innovation, and its modern farming models are some of the most advanced in the world. These models are based on a number of principles, including: Sustainability, Efficiency, Innovation. These principles have helped Swedish agriculture to become one of the most productive in the world.

Swedish modern farming models can be used as a tool for industrial agriculture in other countries. These models can help to improve the productivity and sustainability of agriculture around the world. Some of the specific modern farming models used in Sweden: Precision agriculture, Integrated crop-livestock systems, Cover cropping, Zero-tillage agriculture, Sustainable intensification. However, it is important to note that challenges include: The high cost of technology, The need for skilled labor, The need for cooperation, Increased productivity, Reduced environmental impact, Improved food safety, Increased profitability.

Overall, Swedish modern farming models offer a promising approach to sustainable and productive agriculture. These models can be used to improve the productivity and sustainability of agriculture around the world.

Australia

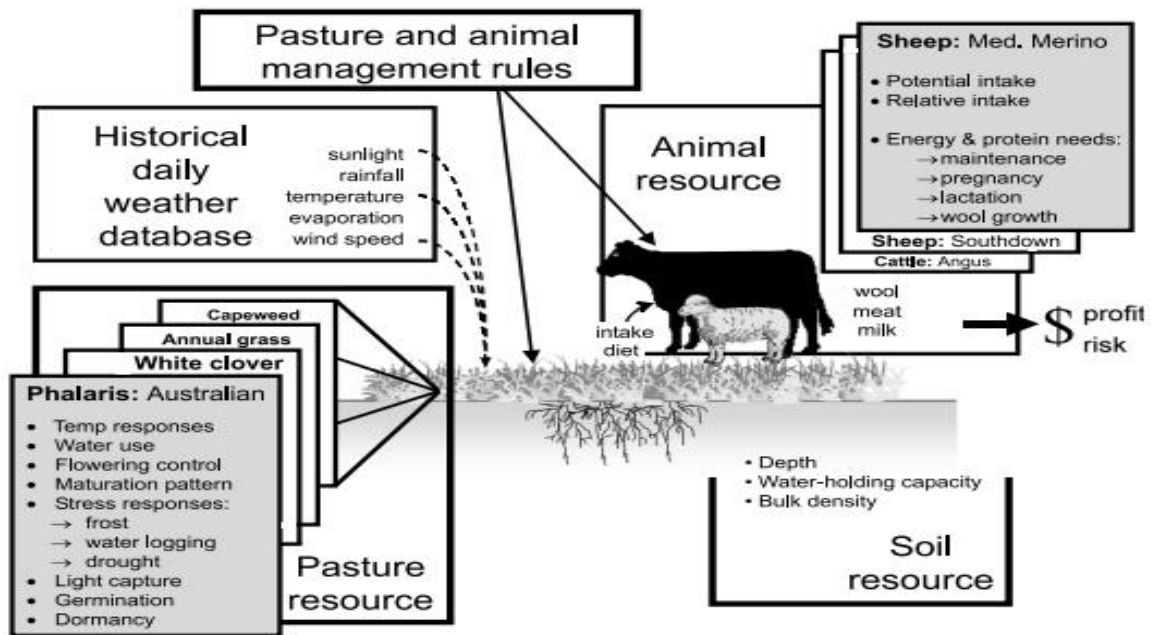
Industrial agriculture in Australia has distinct characteristics influenced by the country's geography, climate, and agricultural history. Australia's agricultural sector is diverse and plays a significant role in the nation's economy, contributing to both domestic and international markets. Here are some key features of industrial agriculture in Australia:

Large-scale Farming, Monoculture and Specialization, Use of Technology, Intensive Livestock Production; Cattle, poultry, and pigs are raised in high-density operations to meet the demand for meat products. Chemical Inputs, Export-oriented- Industrial agriculture in Australia is export-oriented, with a significant proportion of its agricultural products being sold in international markets. Major exports include wheat, barley, beef, wool, and dairy products. Sustainable Practices, Water Management, Regional Differences.

The GrassGro Model

The GrassGro decision support tool's representation of the resources in the grazing system. The soil, pasture species, animal enterprise, and user-specified management criteria control pasture and animal production based on historical daily weather data. It is possible to replicate daily production over a period of years and assess the environmental, production, and commercial hazards related to climate variability (John et al., 2002).

Figure 9. GrassGro model.



Developing Countries

India

India is a major agricultural producer, and the agricultural sector employs about 50% of the country's workforce. In recent years, there has been a growing shift towards industrial

agricultural models in India. These models are characterized by the use of large-scale mechanization, irrigation, and chemical inputs.

Industrial agriculture has had a number of positive impacts on the Indian agricultural sector. These include: Increased yields, which have helped to reduce food insecurity, Increased incomes for farmers, Reduced drudgery for farmers, Improved food safety.

However, industrial agriculture has also had a number of negative impacts include depletion of natural resources, such as water and soil, Pollution of air and water, decline in biodiversity, Increased risk of pests and diseases, Concentration of land ownership.

Some of the industrial agricultural models that are being used in India include:

Integrated farming systems Models

Integrated Farming Systems (IFS) can indeed serve as a valuable tool for promoting sustainable and efficient agricultural practices within the context of industrial agriculture in India. IFS involves the integration of various agricultural activities on a single farm to achieve multiple benefits. While industrial agriculture often focuses on maximizing productivity, IFS aligns well with this goal by optimizing resource use, diversifying income sources, and promoting environmental sustainability. Here's how IFS can function as a tool for industrial agriculture in India: *Resource Optimization, Diversification of Income:* IFS, with its combination of crops, livestock, poultry, and fisheries, provides farmers with diverse income streams, reducing the economic risk associated with relying solely on one product. *Risk Reduction:* Diversification through IFS can help buffer against the impacts of climate variability, pests, and diseases. *Nutrient Cycling and Soil Health, Reduced Environmental Impact:* IFS models often emphasize reduced chemical inputs and greater reliance on natural processes for pest control and nutrient management. This aligns with the sustainability goals of industrial agriculture by minimizing negative environmental impacts, efficient waste management, resource use efficiency, biodiversity conservation.

Local Food Systems: IFS often produces a diverse range of food products, supporting local food systems and enhancing food security at the community level.

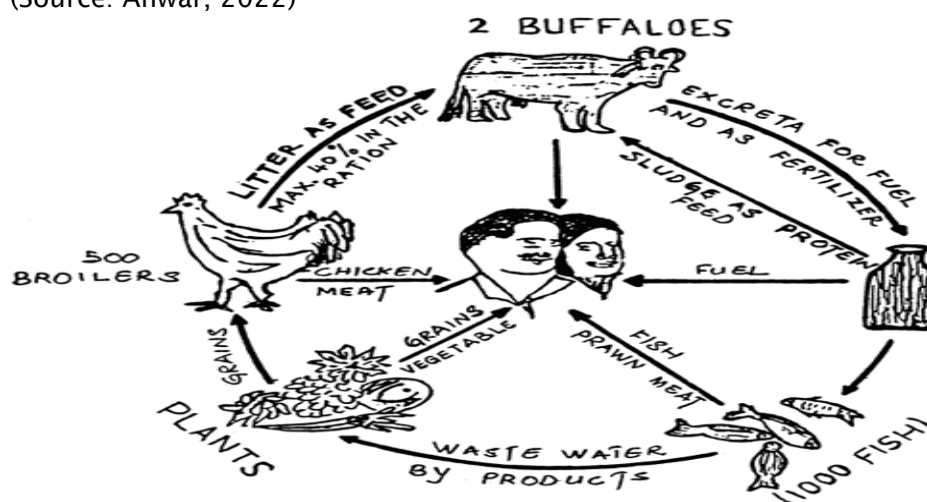
Knowledge Transfer and Skill Development: Implementing IFS requires a higher level of knowledge and management skills. This can empower farmers to make informed decisions and adapt to changing conditions, a crucial aspect of successful industrial agriculture. It's important to note that while IFS offers numerous benefits, its successful implementation requires careful planning, monitoring, and management.

Diagrammatic models of India's integrated farming system models:

The integrated fish-cum-rice farming system: This system involves raising fish in ponds or flooded fields along with rice. The fish help to control pests and diseases, and they also provide an additional source of income for farmers.

The integrated livestock-cum-crop farming system: This system involves raising livestock, such as cows, goats, or chickens, along with crops. The livestock provide manure, which can be used to improve soil fertility. They also provide milk, meat, or eggs, which can provide an additional source of income for farmers.

Figure 10. Integrated livestock-cum-crop farming system in India
(Source: Anwar, 2022)



The integrated agroforestry system:

The integrated watershed management system:

These are just a few of the many integrated farming system models that are used in India. These models have helped to improve the productivity, sustainability, and resilience of agricultural production in India.

By integrating different components of the agricultural system, such as crops, livestock, trees, and water, farmers can achieve a more balanced and productive system.

Contract farming: This is a system in which farmers enter into contracts with companies to grow specific crops. The companies provide the farmers with inputs, such as seeds, fertilizers, and pesticides, and they also purchase the crops at a predetermined price.

Crop processing using phytolith analysis

Models of millet and rice processing are investigated in regard to expected patterns in both macro-remains and phytoliths. The usefulness of these models is illustrated by archaeological data from the Mahagara site, a prehistoric farming settlement in North-Central India (Harvey and Fuller, 2005).

Vertical farming: This is a type of indoor farming that uses stacked layers of growing beds. Vertical farming can be used to grow crops in urban areas, where land is scarce.

Precision agriculture: This is a system that uses data and technology to manage agricultural operations more efficiently. Precision agriculture can be used to optimize the use of inputs, such as water and fertilizer, and to improve crop yields.

The use of industrial agricultural models in India is likely to continue to grow in the future. However, it is important to ensure that these models are used in a sustainable way that does not damage the environment or the livelihoods of farmers.

China-Intensive Cropping

China has a long history of intensive farming and this tradition has continued into the present day. China has been actively employing intensive cropping models as a tool for its industrial

agriculture efforts to enhance agricultural productivity and food security. China's intensive cropping models are characterized by the following features: Multiple cropping: China to grow a winter crop, such as wheat, followed by a summer crop, such as corn. High-yielding varieties: Intensive use of inputs: Mechanization:

These intensive cropping models have helped China to achieve self-sufficiency in food production. However, they have also come at a cost to the environment. China is now one of the world's largest emitters of greenhouse gases, and its agricultural sector is a major contributor to this problem.

China is now looking for ways to make its agricultural production more sustainable. This includes developing new crop varieties that are more resistant to pests and diseases, reducing the use of chemical inputs, and improving water management.

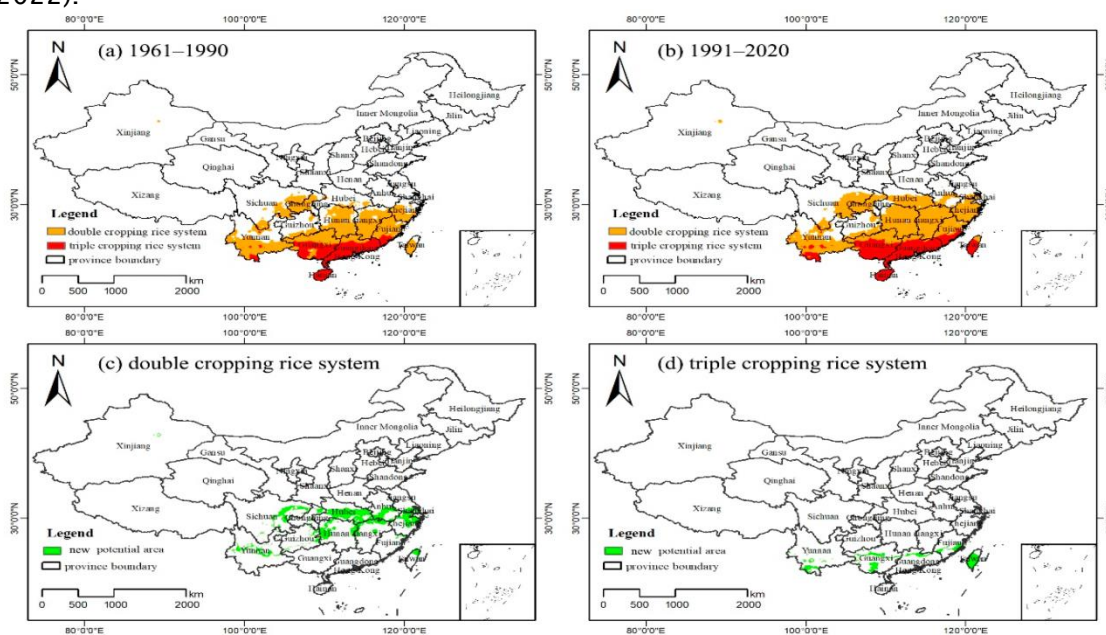
Here are some of the challenges and opportunities of China's intensive cropping models: High input costs, Environmental pollution, Labor shortages. Opportunities: Increased yields, Improved efficiency, Increased income.

Some diagrammatic models of China's intensive cropping models which lead to increase in rice production:

The double-rice cropping system: This is the most common intensive cropping system in China. It involves growing two crops of rice in the same field each year. The first crop is planted in the spring and harvested in the summer. The second crop is planted in the fall and harvested in the winter.

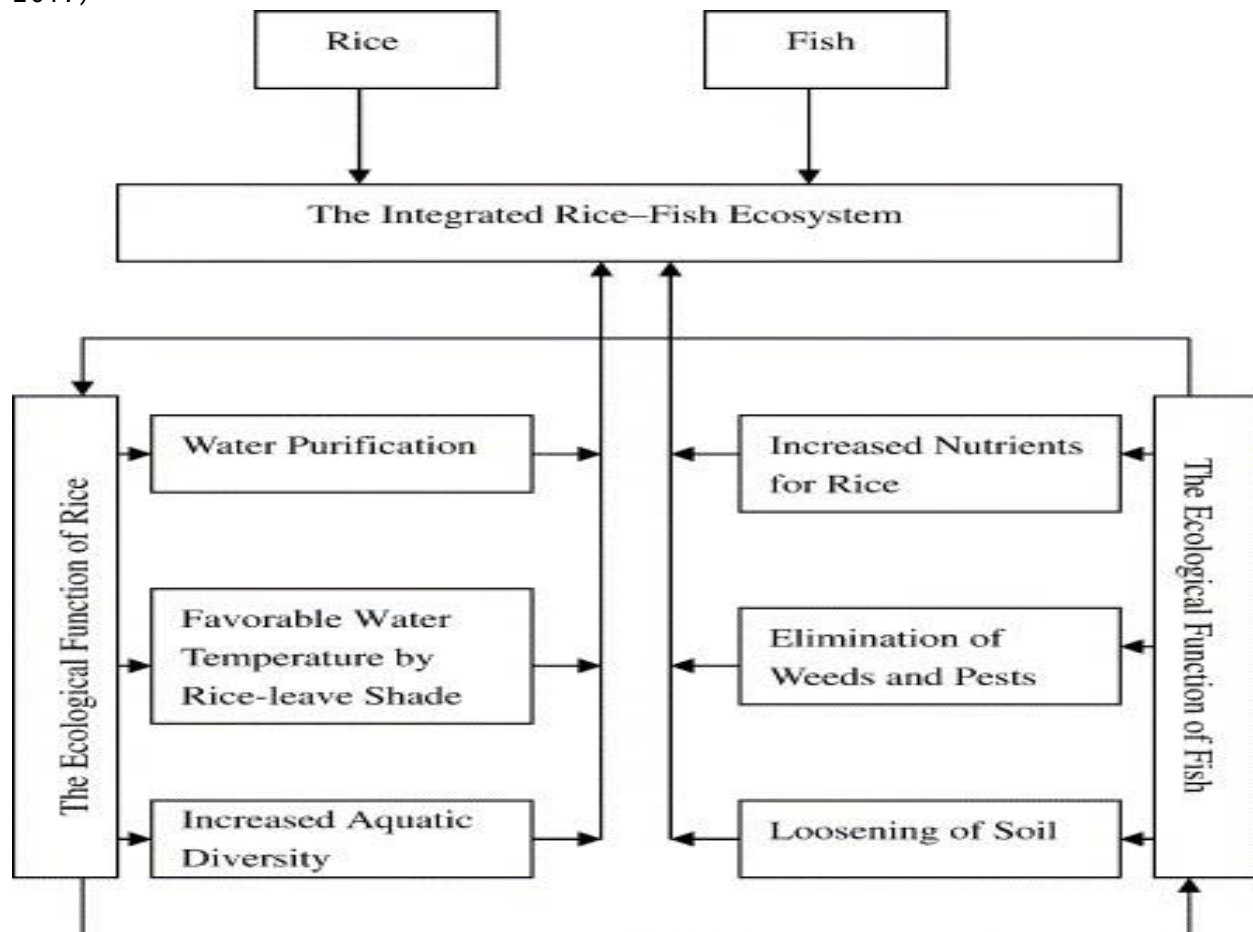
The triple-rice cropping system: This system is becoming increasingly popular in China. It involves growing three crops of rice in the same field each year. The first crop is planted in the spring and harvested in the summer. The second crop is planted in the summer and harvested in the fall. The third crop is planted in the fall and harvested in the winter.

Figure 11. Potential planting areas for the double and triple rice cropping systems for the time periods of (a) 1961–1990 and (b) 1991–2020, as well as new potential planting areas for the double and triple rice cropping systems (Source: Zhuo et al., 2022).



The fish-rice cropping system: This system involves raising fish in ponds or flooded fields along with rice. The fish help to control pests and diseases, and they also provide an additional source of income for farmers.

Figure 12. Fish-rice cropping system in China Opens in a new window. (Source: Altieri et al., 2017)



Israel

Israel has been a pioneer in the adoption of precision farming techniques as a tool for enhancing industrial agriculture. Israel's arid climate and limited water resources have driven the country to develop innovative agricultural methods, many of which fall under the umbrella of precision farming. Here's how Israel's precision farming practices contribute to its industrial agriculture: *Drip Irrigation*: Israel is credited with developing and popularizing modern drip irrigation technology. *Soil and Moisture Sensors*: Precision farming relies on real-time data to make informed decisions. *Remote Sensing and Imaging*: Satellite imagery and aerial drones are used to capture high-resolution images of fields. *Variable Rate Technology*: *Smart Irrigation Management Systems*: *Precision Planting and Seeding*: *Data Analytics and Decision Support Systems*: *Protected Agriculture*: *Desalination and Water Management*: *Research and Innovation*: *Knowledge Sharing*: Israel's success in precision farming has led to international collaborations and partnerships, where its expertise is shared with other countries facing similar agricultural challenges.

Israel's precision farming practices are well-known for their efficiency, sustainability, and ability to maximize productivity in challenging environments. These practices align closely with the principles of industrial agriculture by utilizing technology to optimize resource use, increase yields, and reduce environmental impact.

Some diagrammatic models of Israel's precision farming:

The decision support system (DSS) model: This model uses data from sensors, drones, and satellite imagery to help farmers make decisions about crop management. For example, the DSS can be used to determine the optimal amount of water and fertilizer to apply to a field, or to identify areas of the field that are at risk of pests or diseases.

The variable rate technology (VRT) model: This model uses GPS technology to control the application of inputs, such as water and fertilizer. VRT allows farmers to apply inputs more precisely, which can help to reduce costs and improve crop yields.

The remote sensing (RS) model: This model uses satellite imagery to collect data about a field, such as crop growth, soil moisture, and nutrient levels. RS can be used to monitor crop health and identify areas of the field that need attention.

The geographic information system (GIS) model: This model uses spatial data, such as maps and aerial images, to help farmers manage their land. GIS can be used to plan crop rotations, identify optimal planting dates, and track the movement of pests and diseases.

Figure 13. Decision support system (DSS) model in precision farming. (Source: Zhai et al., 2020)

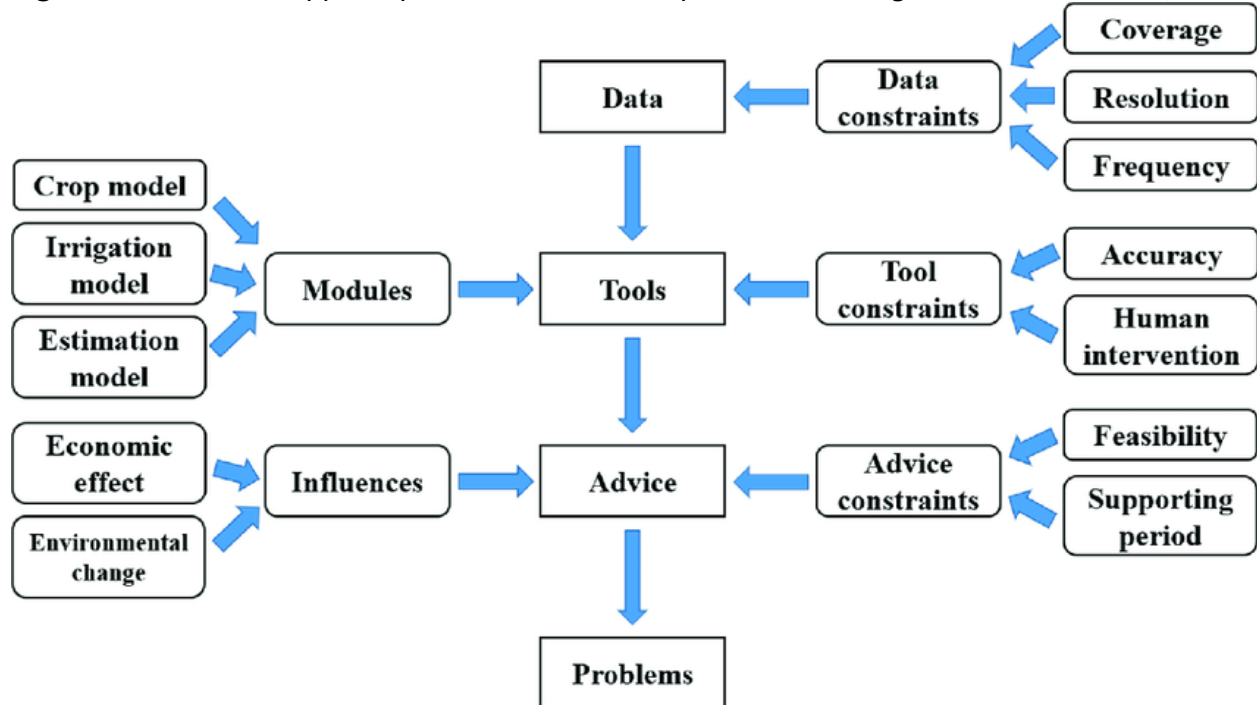
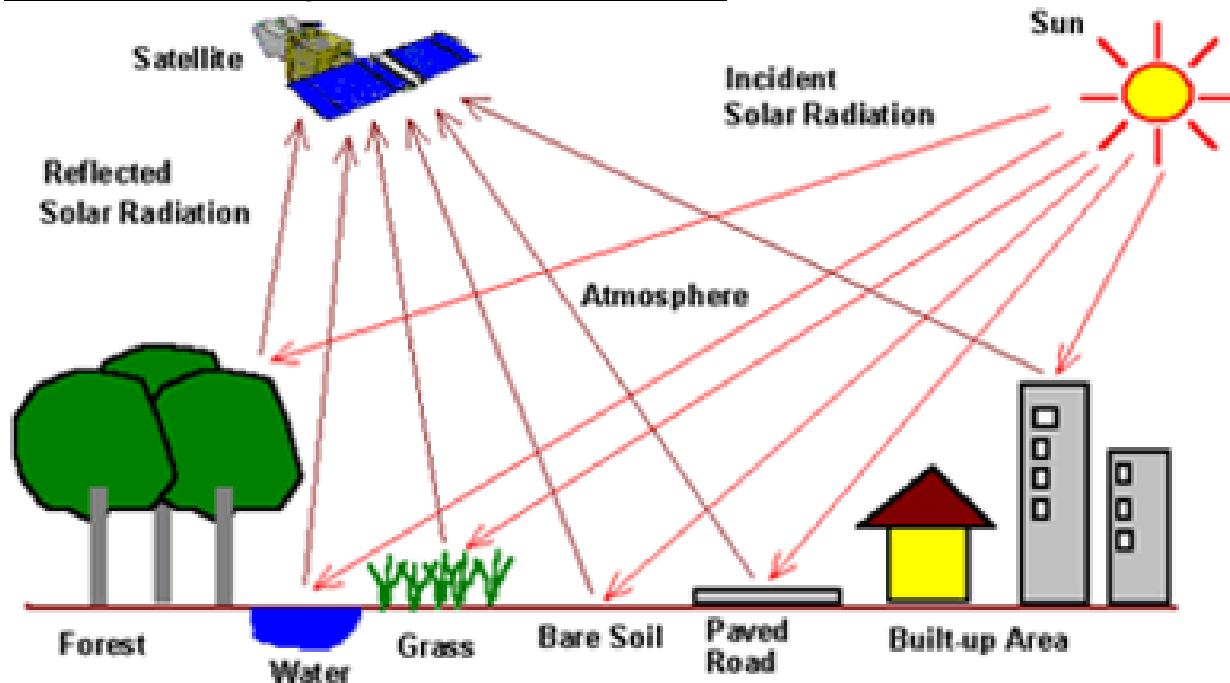


Figure 14. Remote sensing (RS) model in precision farming. (Source: Anonymous, <https://crisp.nus.edu.sg/~research/tutorial/optical.htm>)



South Africa

South Africa's dual agricultural economy is characterized by a small number of large-scale commercial farms that produce the majority of the country's food, and a large number of small-scale subsistence farms that produce food for their own consumption. This dual system has its roots in the country's colonial history, when land was expropriated from black farmers and given to white settlers. The dual agricultural economy has a number of challenges, including: Inequality, Environmental degradation, Food security-South Africa is a net importer of food, and the country is vulnerable to food shortages. The dual agricultural economy can be used as a tool for industrial agriculture. However, it is important to address the challenges of inequality, environmental degradation, and food security. This can be done by Supporting small-scale farmers, Promoting sustainable agriculture, Investing in infrastructure.

Here are some specific examples of how the dual agricultural economy in South Africa can be used as a tool for industrial agriculture:

Contract farming: Contract farming is an arrangement where a large-scale commercial farm contracts with a small-scale farmer to grow crops or raise livestock. The large-scale farm provides the inputs, such as seeds, fertilizer, and machinery, and the small-scale farmer provides the land and labor. The profits are then shared between the two parties.

Joint ventures: Joint ventures are partnerships between a large-scale commercial farm and a small-scale farmer. The two partners share the risks and rewards of the venture.

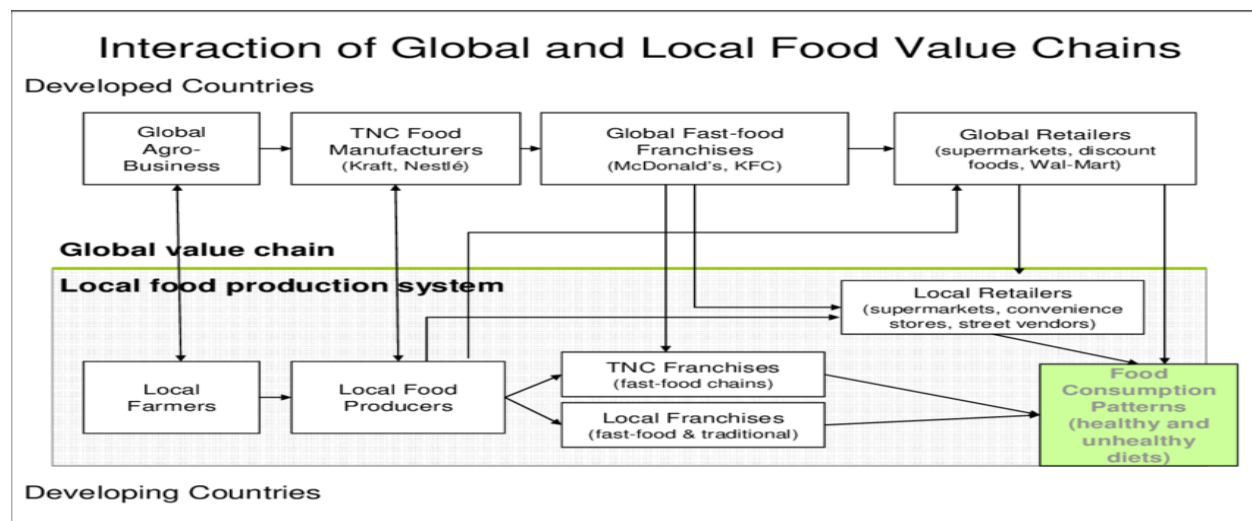
Land reform: Land reform is the process of redistributing land from large-scale commercial farms to small-scale farmers. This can help to address the inequality in the dual agricultural economy.

Sustainable agriculture: Sustainable agriculture is the practice of farming in a way that protects the environment and conserves resources. This can be done by using practices such as crop rotation, integrated pest management, and water conservation.

Corporates (MNCs and TNCs) Industrial Agriculture Models

Multinational Corporations (MNCs) and Transnational Corporations (TNCs) play a significant role in shaping the landscape of industrial agriculture. They often act as tools for advancing and influencing agricultural practices globally. Models that illustrate how MNCs and TNCs function as tools in the context of industrial agriculture are Agribusiness Model, Input Supply-MNCs/TNCs provide agricultural inputs such as seeds, fertilizers, pesticides, and machinery. Production Control: They may own or contract with large-scale farms for efficient production. Processing and Distribution: These corporations often own processing and distribution facilities. Market Access: They leverage their global presence to access international markets. Advantages: Increased productivity, economies of scale, and access to global markets.

Figure 15. Corporate (MNCs and TNCs) industrial Agriculture Models (Source: Gereffi and Christian, 2008)



Vertical Integration Model:

- Control Over the Supply Chain: MNCs/TNCs own every stage of the supply chain from inputs to retail.
- Efficiency: This model allows for tight control, efficiency, and quality assurance.
- Risk Mitigation: Reduces risks associated with price fluctuations and supply disruptions.
- Advantages: Enhanced quality control, cost efficiencies, and better risk management.

Figure 16. Vertical Integration model. (Source: Cronin et al., 2019)

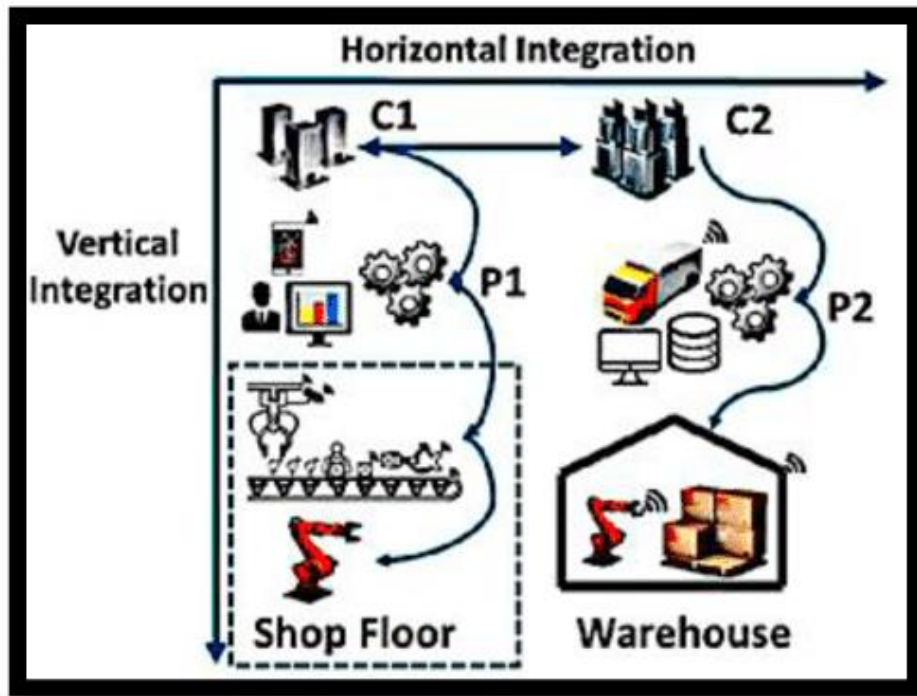
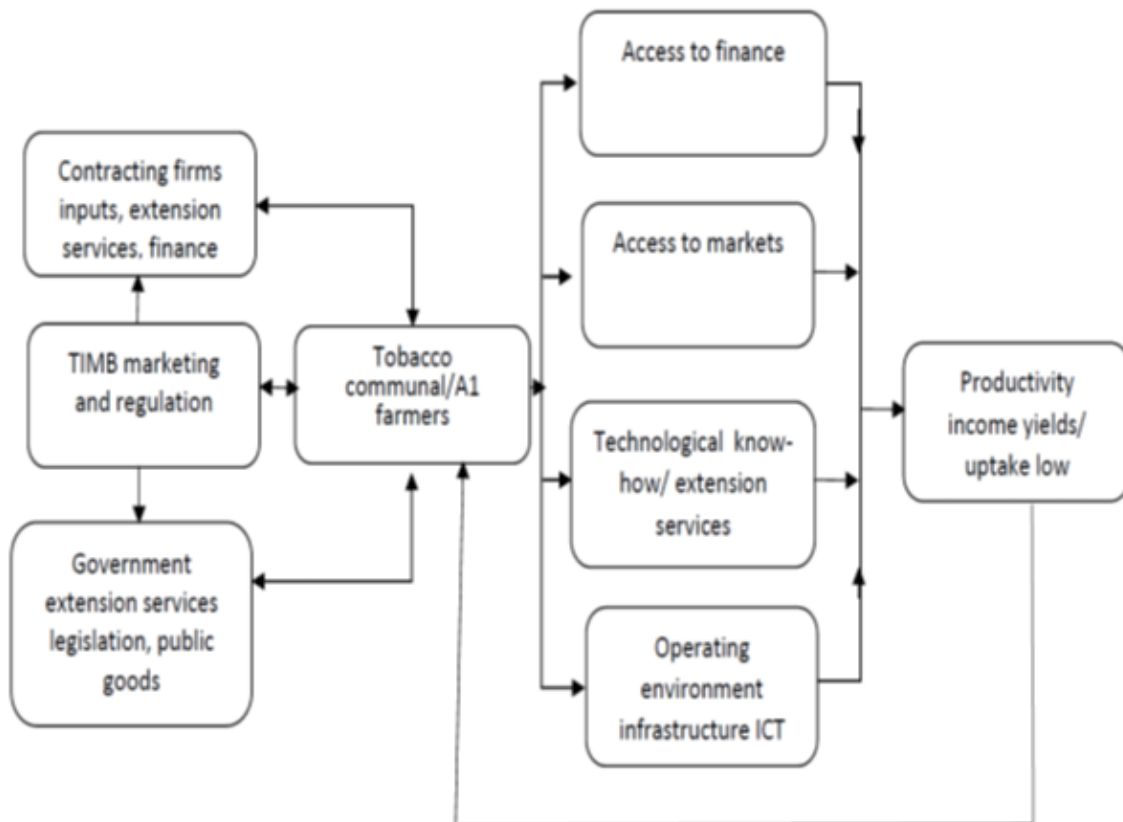


Figure 17. Conceptual model for tobacco contract farming. (Source: Chitongo, 2017)



Contract Farming Model:

- Contracts with Small Farmers: MNCs/TNCs enter into contracts with local smallholder farmers.
- Technical Support: Provide farmers with inputs, technology, and training.
- Guaranteed Markets: Farmers have a guaranteed buyer for their produce.
- Advantages: Income stability for small farmers, consistent quality, and supply for corporations.

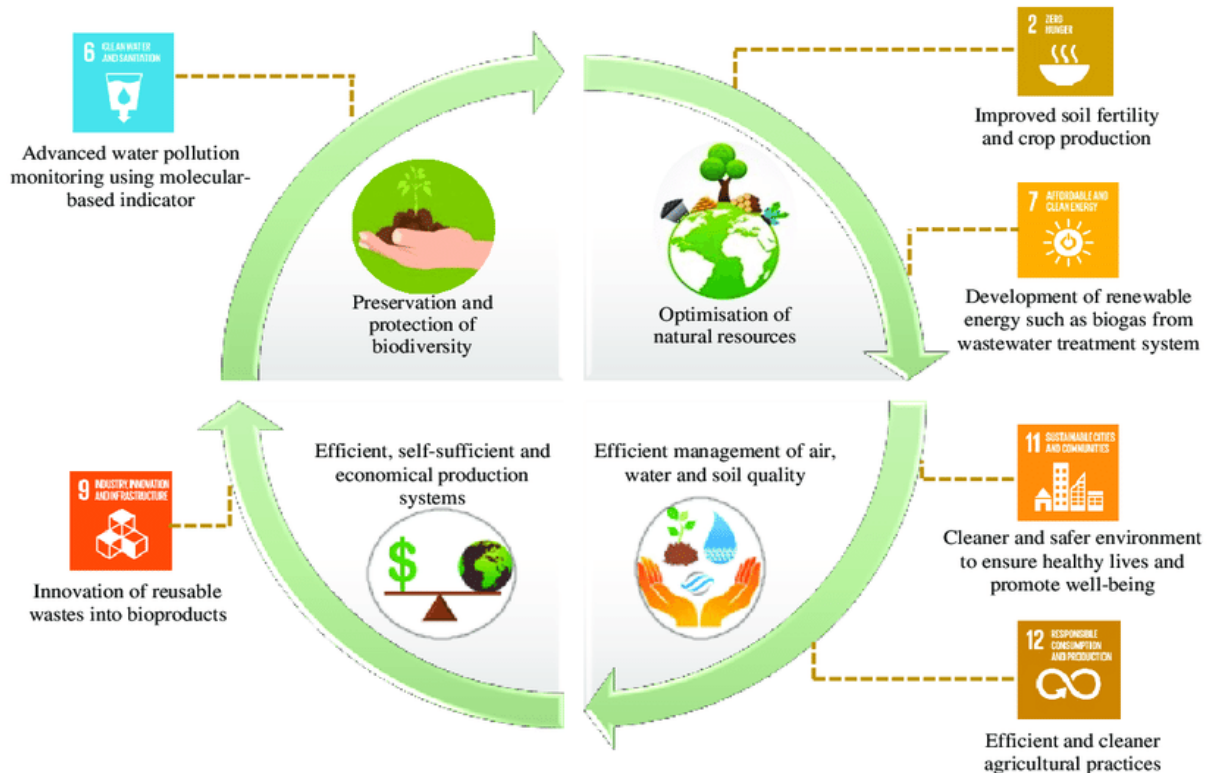
Biotechnology and Genetic Modification Model:

- Research and Development: MNCs invest heavily in biotechnology and genetic modification of crops.
- Patent Control: They hold patents on genetically modified seeds.
- Market Dominance: Control over proprietary seeds and traits.
- Advantages: Improved crop characteristics, increased yields, and market control.

Sustainable Agriculture Model:

- Environmental Focus: MNCs/TNCs adopt sustainable and organic farming practices.
- Consumer Demand: Respond to consumer demands for environmentally-friendly products.
- Certification: Seek organic and sustainability certifications.
- Advantages: Meeting consumer preferences, reducing environmental impact, and long-term sustainability.

Figure 18. Sustainable agriculture principles. (Source: Sharuddin et al., 2022)



Global Market Expansion Model:

- Globalization Strategy: Expand operations to emerging markets with growing agricultural sectors.
- Market Share Acquisition: Acquire local companies to gain market share.
- Adaptation: Tailor products and practices to suit local conditions.
- Advantages: Access to new markets, diversification, and increased profitability.

Figure 19. International marketing entry method (Source: Anonymous, https://theintactone.com/2018/12/08/im-u1-topic-8-international-market-entry-continuum-modes-joint-venture-setting-up-of-wholly-owned-subsidiaries-abroad-strategic-alliances/#google_vignette)



These models showcase how MNCs and TNCs operate as tools in industrial agriculture, influencing everything from the supply chain and production methods to research and market expansion. Each model has its own set of advantages and challenges, and their impact on local and global agriculture varies based on factors like corporate strategies, government regulations, and consumer preferences.

Here are some of the potential benefits of corporate involvement in industrial agriculture:

Increased efficiency: Corporates can use their financial resources and expertise to improve the efficiency of agricultural production. This can lead to lower prices for consumers and higher profits for farmers.

Increased innovation: Corporates can invest in research and development to develop new technologies for agricultural production. This can help to improve yields, reduce the use of pesticides and fertilizers, and make farming more sustainable.

Increased market access: Corporates can help farmers to access new markets for their products. This can help to improve farmers' incomes and reduce poverty.

Here are some of the potential drawbacks of corporate involvement in industrial agriculture.

Increased concentration of power: Corporates can become increasingly powerful in the agricultural sector. This can lead to higher prices for consumers and less choice for farmers.

Environmental damage: Corporates may use practices that damage the environment, such as excessive use of pesticides and fertilizers.

Human rights abuses: Corporates may exploit workers in developing countries.

The debate over the role of corporates in industrial agriculture is likely to continue for many years to come. It is important to weigh the potential benefits and drawbacks carefully when considering the future of this system.

V. Conclusions

Global Nature of Agricultural Industry is progressing in the Global liberalization Era. Agriculture, which is strongly ingrained in global history, culture, and civilization, has seen substantial modifications as a result of industrialization and commercialization. The possibilities and difficulties smallholder farmers confront in the context of agricultural commercialization, the consequences of technology improvements on agriculture, and the influence of governments restrictions and subsidies on industrialization and commercialization are all explored in this study. The study is research on Global Agriculture Industrial development models evaluation. The present paper analyzes the global countries, UNO, World Bank, IMF, WTO and MNCs, TNCs, Philanthropic corporate Industrial agricultural models and their characters, advantages & disadvantages. Finally, The study suggest strategies and policies for more profitable models of Industrial models for the globe. The results show that over the years, the industry has undergone a process called "vertical integration".

The results shows that the adopted models; USA- Industrial Agriculture, Canada- Value-added Production Industrial Agriculture, Mexico- Commercial Agriculture, Brazil-Integrated Farming and Low Carbon Farming, UK-Mechanized and Industrial agriculture models, Germany-Smart Farming, Switzerland-Organic Farming, Russia-Market oriented models, Sweden- Modern farming models, Australia-Conservation Farming, India-IFS Model, China-Intensive farming Models, South Africa-Dual agriculture economy. MNC's TNC's-Global Corporate Farming Models, World Bank: Global markets via value-chains originating in industrial agricultur, IMF: International partnership for sustainable development, WTO: "global partnership" Model, UNO: inclusive business models in Agriculture and Food systems for sustainability, UN ESCAP and Billgate: inclusive business models partnership in Sub-Saharan Africa and Southeast Asia.

The results of global countries models features reveal that USA: The industrial agriculture model is characterized by Large-scale, monoculture production, Mechanization and automation. Use of synthetic fertilizers and pesticides, Government subsidies. It has also had a number of negative impacts, including: Environmental degradation, Public health concerns, Economic inequality. The practical models are The corn-soybean complex: Integrated crop-livestock systems, Data Flow Diagram (DFD) Model. Canada: The value added production models in the Canadian agriculture sector are driving the growth are : The rise of automation, The growth of new markets, Value-added exports. Mexico: Mexico's commercial agriculture sector incorporating elements of industrial agriculture to enhance productivity and economic growth. Mexico's commercial agriculture is often geared towards export markets, producing crops that are in demand internationally. Brazil- Brazil has been a leader in developing intensive low-

carbon farming models. Some of the most promising models include: Zero-tillage agriculture: Integrated crop-livestock-forestry systems: Conservation agriculture: Sustainable intensification. UK's mechanized and commercial agriculture models for industrial agriculture. The benefits are Increased productivity, Specialization, Reduced costs, Improved food safety. Some of the potential drawbacks of using the UK's mechanized and commercial agriculture models for industrial agriculture: Environmental impacts, Social impacts, Food security. Germany: Germany in recent years, there has been a growing interest in using digital technologies in agriculture. Some specific examples of how digital technologies are being used in German small farming: Precision agriculture, Remote sensing, Artificial intelligence (AI). Switzerland: The Swiss government has a number of policies in place to support organic farming. These policies have helped to make organic food more affordable and accessible to consumers. Russia: Russia's agricultural sector has undergone a significant transformation in recent years. One of the most common models is the contract farming model. Another common model is the joint venture model. A third model is the corporate farming model. Russia has the potential to become a major agricultural power. Sweden: Sweden modern farming models are some of the most advanced in the world. These models are based on a number of principles, including: Sustainability, Efficiency, Innovation. Swedish modern farming models can be used as a tool for industrial agriculture in other countries. These models can help to improve the productivity and sustainability of agriculture around the world. Some of the specific modern farming models used in Sweden: Precision agriculture, Integrated crop-livestock systems, Cover cropping, Zero-tillage agriculture, Sustainable intensification. Australia: Australia's agricultural sector key features of industrial agriculture are: Large-scale Farming: Monoculture and Specialization: Use of Technology: Intensive Livestock Production: Cattle, poultry, and pigs are raised in high-density operations to meet the demand for meat products. India: Industrial agriculture model has had a number of positive impacts on the Indian agricultural sector. These include: Increased yields, which have helped to reduce food insecurity. Increased incomes for farmers. Reduced drudgery for farmers. Improved food safety. China: China has been actively employing intensive cropping models as a tool for its industrial agriculture efforts to enhance agricultural productivity and food security. China's intensive cropping models are characterized by the following features: Multiple cropping, the double-rice cropping system, the triple-rice cropping system, the fish-rice cropping system.

Israel: Israel has been a pioneer in the adoption of precision farming techniques as a tool for enhancing industrial agriculture. Israel's precision farming practices are well-known for their efficiency, sustainability, and ability to maximize productivity in challenging environments.

South Africa: South Africa's dual agricultural economy can be used as a tool for industrial agriculture. However, it is important to address the challenges of inequality, environmental degradation, and food security. Some specific examples South Africa can be used as a tool for industrial agriculture: Contract farming: Joint ventures: Land reform: Sustainable agriculture:

Corporates (MNCs and TNCs) industrial Agriculture Models

Multinational Corporations (MNCs) and Transnational Corporations (TNCs) play a significant role in shaping the landscape of industrial agriculture. They often act as tools for advancing and influencing agricultural practices globally. Models that illustrate as tools in the context of industrial agriculture: Agribusiness Model, Vertical Integration Model, Contract Farming Model, Biotechnology and Genetic Modification Model, Sustainable Agriculture Model, Global Market Expansion Model. Globalization Strategy: Expand operations to emerging markets with growing agricultural sectors. Here are some of the potential benefits of corporate involvement in industrial agriculture: Increased efficiency, Increased innovation, Increased market access. Some of the potential drawbacks of corporate involvement in industrial agriculture: Increased concentration of power: Environmental damage: Human rights abuses: Corporates may exploit workers in developing countries. World Bank: Global markets via value-chains originating in industrial agriculture, IMF: International partnership for sustainable development, WTO: "global partnership" is codified in the WTO mission, UNO: inclusive business models in Agriculture and

Food systems for sustainability & Ecology, UN ESCAP and Billgate: inclusive business models partnership in Sub-Saharan Africa and Southeast Asia

The study suggest to adopt Russian models; Contract farming, Joint venture, corporate models which minimizes the resource constraints, advanced technologies adoption and linking global supply chains for small farms of developing countries in general and Asia and Africa in particular. MNCs and TNCs function as tools in the context of industrial agriculture: agribusiness model, vertical integration model, contract farming model, biotechnology and genetic modification model, sustainable agriculture model, global market expansion model. International cooperation for standards and technology transfer ensures a global commitment to sustainable agriculture. International Monetary Fund (IMF) and the World Bank are specifically recommended for cooperation, World Trade Organization (WTO) has expanded its mandate over time to include cooperation with the UN system, OECD, and other international partners.

The study suggest the policies are Global Countries play crucial role in market shaping in agriculture. Governments, Private sectors, Academia, civil societies partnership in locally, regionally and globally important for food security sustainability and ecology. MNC's TNC's-Global Corporate Farming Models, Transparency, accountability, and mandatory reporting ensure responsible corporate behavior. Israel's success in precision farming has led to international collaborations and partnerships, where its expertise is shared with other countries facing similar agricultural challenges and with potential benefits of efficiency, sustainability, and ability to maximize productivity in challenging environments. Sweden has modern farming models are some of the most advanced in the world. These models are based on a number of principles, including: Sustainability, Efficiency, Innovation. These modern farming models can be used as a tool for industrial agriculture in other countries

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Global Carbon Markets and Trading Economic Complexities: Protocols, Agreements, Policies, and Prospects

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Abstract

The study analyzes the global carbon credit system and carbon markets, tracing their origins from international agreements like the Kyoto Protocol to the current challenges posed by the 2022 global energy crisis. Revenue from carbon taxes and ETSs grew by over 10% in 2022, reaching nearly \$95 billion worldwide. The revenue is influenced by factors such as the carbon price, covered emissions, and design features. Compared to the previous year, global revenue from carbon taxes and ETSs increased by approximately \$10 billion. The study explores the differences between compliance and voluntary carbon markets, highlighting the economic complexities faced by governments when implementing carbon pricing policies during the energy crisis. It also discusses global carbon markets, bilateral cooperation with countries like China and Korea, and multilateral collaborations. The financial performance of carbon taxes and ETSs, which reached a record \$95 billion globally in 2022, is emphasized. The study also examines the emerging scenario of pricing agricultural emissions, using New Zealand's pioneering efforts as an example. The methodology used is a research-based off on reports from ICAP, UNFCCC, UNDP, World Bank, and other reputed sources. The objectives of this are to shed light on various carbon trading endeavors around the world and to track their progress with respect to the Paris Agreement guidelines. It is observed that world governments are making great strides in implementing carbon laws through means of stringent monitoring and effective pricing of carbon credits. Thus also raising vast amounts of revenue which are diverted into areas requiring improvement. It is recommended that developed countries continue to aid developing countries in implementing carbon policies through means of financial relief or infrastructural aid via partnerships, strong capacity-building programs must be initiated and implemented stringently.

Keywords: Global carbon credit system; carbon markets; carbon trading; policies; prospects

I. Introduction

A carbon credit is an offset mechanism that is issued for an equivalent reduction or absorption of carbon emissions from the atmosphere as a result of a targeted carbon reduction project. These issued credits are supplied to anyone aiming to reduce their effective carbon footprint. So carbon credits are a way to reduce any firm or entity's carbon footprint caused by any amount of unavoidable emissions. By purchasing carbon credits, businesses invest in other projects that help to reduce the effects of greenhouse gas emissions.

Key Points

- Carbon credits were devised as a mechanism to reduce greenhouse gas emissions.
- Companies get a set number of credits, which decline over time, and they can sell any excess to another company.

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- Carbon credits create a monetary incentive for companies to reduce their carbon emissions. Those that cannot easily reduce emissions can still operate, at a higher financial cost.
- Carbon credits based on the cap-and-trade model that was used to reduce sulfur pollution in the 1990s was the first time carbon pricing mechanisms were implemented.
- Global pressure against climate change has caused the prices, uptakes, reforms and plans for said policies to be affected.

The global energy crisis has posed significant challenges for various energy markets around the globe and the world economy in 2022. Governments have initiated measures to shield consumers from price hikes as a response, adding to fiscal pressures encountered and accumulated during the COVID-19 pandemic. In this context, the political economics of introducing new direct carbon pricing policies and implementing the same has become more complex. On the one hand, the increasing urgency of addressing the climate crisis, the benefits of diversifying energy supplies, and the need to shore up government revenues have provided an even stronger rationale for introducing new and strengthening existing carbon pricing policies. On the other hand, pressure on governments to consider any measures to reduce prices in the short term has been working against emissions trading systems (ETSs) and carbon taxes. Developments in existing and planned direct carbon pricing policies (e.g., ETSs, carbon taxes, and crediting mechanisms) over the past year, have to be monitored closely to reveal how any contextual factors have affected prices, uptake, reform, and plans for these policies. (*Manish Dabkara and Samrat Sengupta*).

Objectives

- To study the various carbon mechanisms and co-operations around the world and examine their performance.
- To track the uses of the revenue generated from the various carbon pricing mechanisms.
- To suggest policies for prosperity of Future carbon trading protocols.

II. Research Methodology

This study uses scientific, explorative, perspective, vision-based economics of Global carbon trading evaluation research. The review, synthesis, meta-analysis, perspectives, vision tools, scientific, and political policy approach was employed to global carbon trading. The methodology followed for this document is a comprehensive study of various sources of information from reputed sources like UNDP, UNFCCC, ICAP, World Bank Report 2023, LSEG Data and Analytics, etc. A major source of statistical data for this article was Statista, ICAP reports, IPCC reports, and the European Union Emissions Trading System Report.

The time frame for the study is 1960 to 2022. Secondary data sources are the foundation of the entire investigation. The results were validated using the meta-analysis, scientific methodology, and political policy analysis. Finally, the study suggests the policy measures for future development of global industrial models.

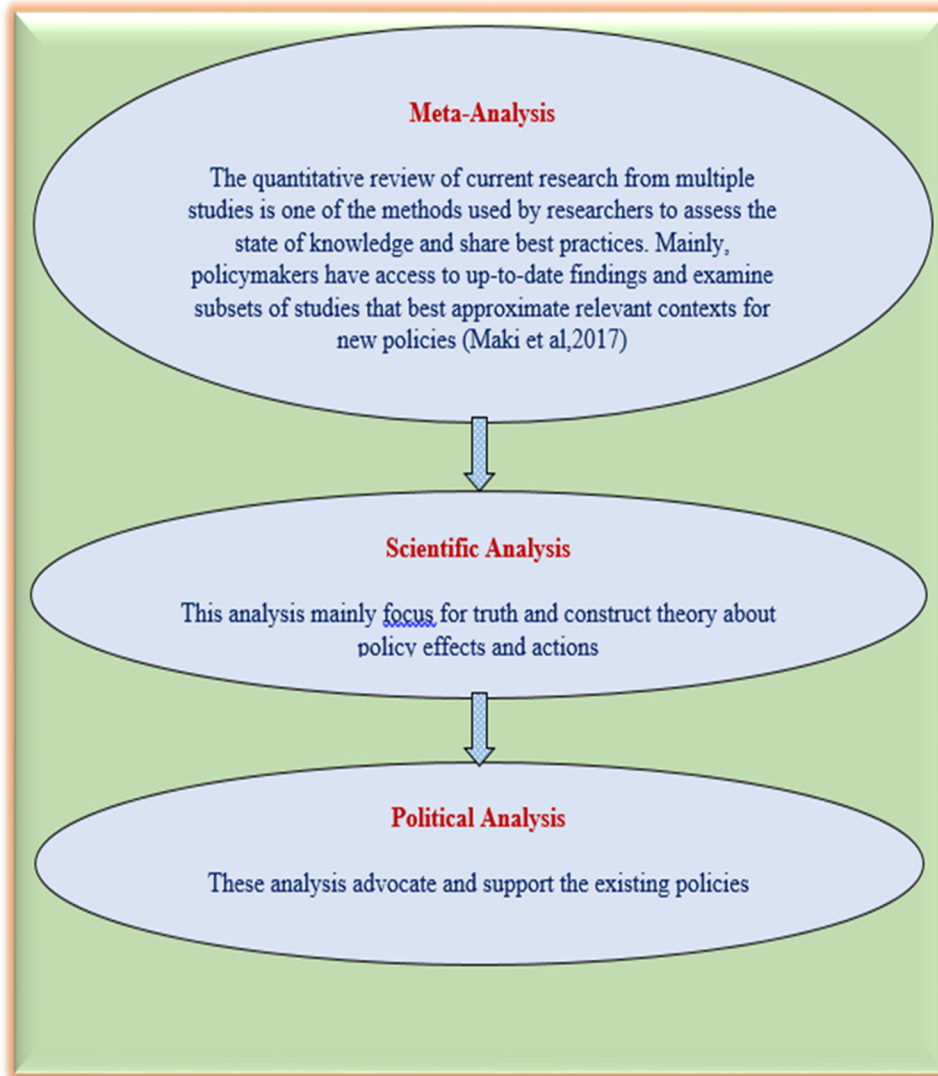
Policy Analysis

The understanding of policy challenges and the advantages of identifying those with workable solutions are made possible by policy analysis (Cairney, 2020). To accomplish the goals of the current study, three main types of analysis were used, as shown below:

1. Meta-analysis
2. Scientific analysis, and
3. Political analysis

The investigation of the global carbon trading policy concerns is done using meta-analysis which is the study of analysis on analysis. The scientific method of policy analysis has contributed to the development of theory and truth regarding the varying national policies around the world. The dominant study recycled primarily political analysis to promote and support the chosen policies.

Figure 1. Policy analysis used in the current study.

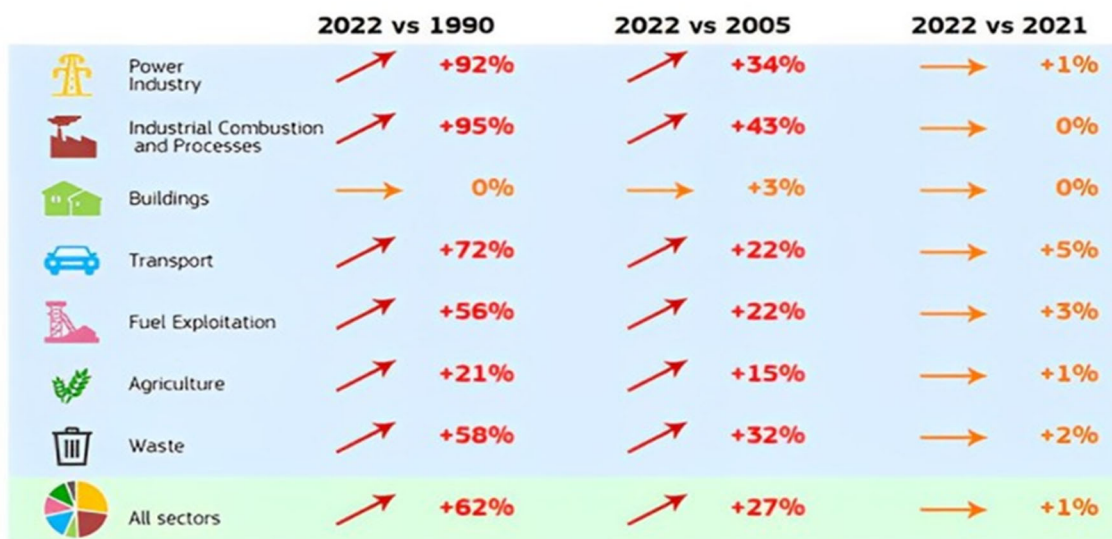


III. Results and Discussion

A carbon credit is an offset mechanism that is issued for an equivalent reduction or absorption of carbon emissions from the atmosphere as a result of a targeted carbon reduction project. These issued credits are supplied to anyone aiming to reduce their effective carbon footprint. So, carbon credits are a way to reduce any firm or entity's carbon footprint caused by any amount of unavoidable emissions. By purchasing carbon credits, businesses invest in other projects that help to reduce the effects of greenhouse gas emissions. The Progress of Carbon Emissions

(Sector-wise) shown in Figure 2. The results show that in 3 different periods the carbon emissions are decreasing drastically.

Figure 2. Progress of Carbon Emissions, (sector-wise).



Source: World Bank Report (2023)

The global energy crisis has posed significant challenges for various energy markets around the globe and the world economy in 2022. Governments have initiated measures to shield consumers from price hikes as a response, adding to fiscal pressures encountered and accumulated during the COVID-19 pandemic. In this context, the political economics of introducing new direct carbon pricing policies and implementing the same has become more complex. On the one hand, the increasing urgency of addressing the climate crisis, the benefits of diversifying energy supplies, and the need to shore up government revenues have provided an even stronger rationale for introducing new and strengthening existing carbon pricing policies. On the other hand, pressure on governments to consider any measures to reduce prices in the short term has been working against emissions trading systems (ETs) and carbon taxes. Developments in existing and planned direct carbon pricing policies (e.g., ETs, carbon taxes, and crediting mechanisms) over the past year, have to be monitored closely to reveal how any contextual factors have affected prices, uptake, reform, and plans for these policies.

3.1. The Emergence of the Carbon Market

The number of carbon pricing mechanisms in operation worldwide is shown in Table 1. In 2023, The number of total national, sub-national initiatives are reasonably well. In 2023, The total number of pricing initiatives are 73.

Table 1. Number of Carbon Pricing Mechanisms in Operation Worldwide as of 2023 by Type.

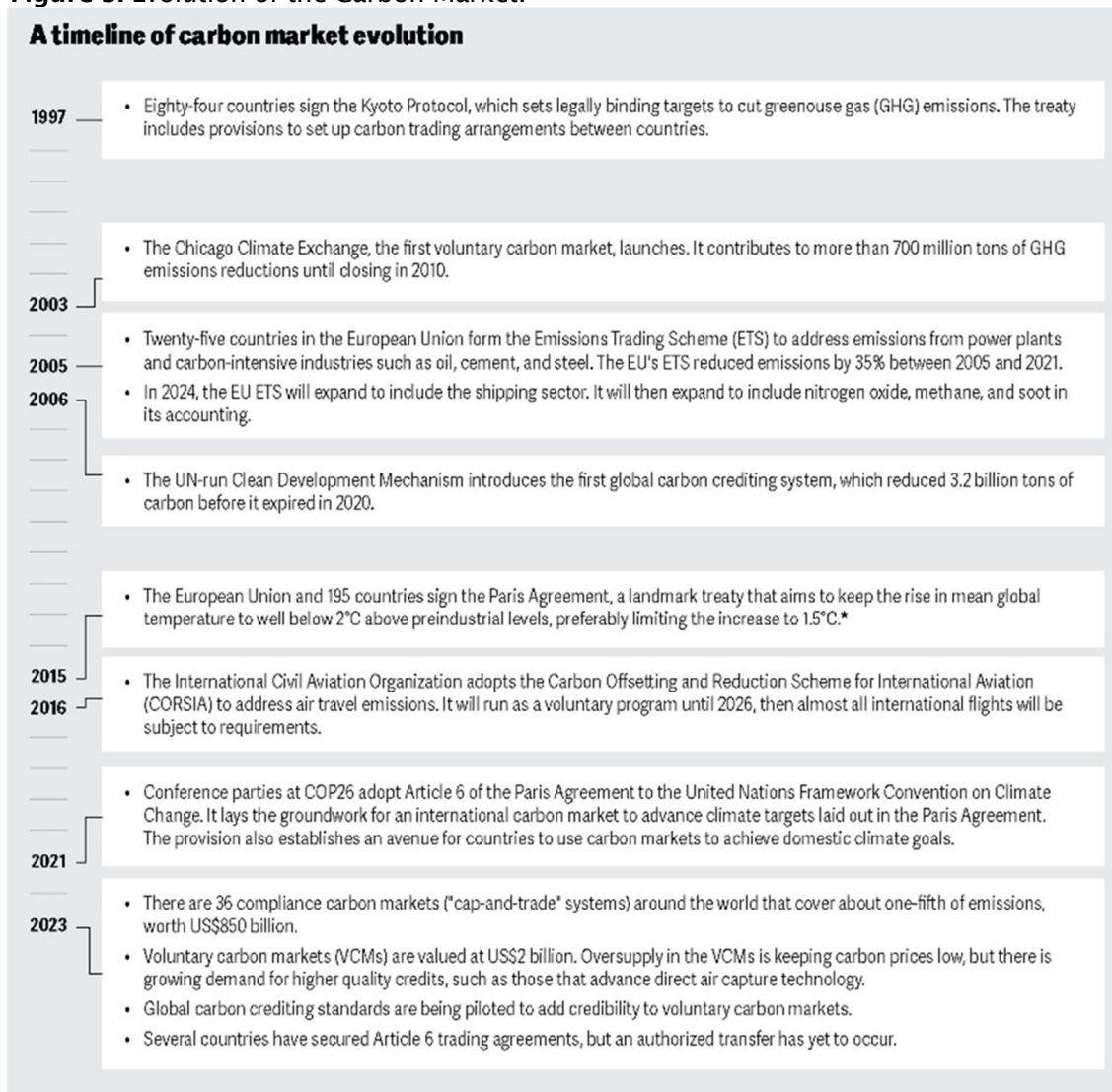
	Total carbon pricing initiatives	Carbon tax	ETS
National initiatives	39	27	12
Regional initiatives	1		1
Sub-national initiatives	33	10	23
Total implemented initiatives	73	37	36

Source: Statista Report (2023)

Carbon trading started formally in 1997 under the United Nations' Kyoto Protocol on Climate Change (COP3) which had more than 150 nation signatories. Parties with commitments under the agreement agreed to limit or reduce their greenhouse gas emissions between 2008 – 2012 to 5.4% which were well below the levels of 1990. Emissions trading, as stated in the Kyoto Protocol, allowed countries to sell any excess capacity of emission units to countries that had levels that exceeded well over their planned targets.

The Kyoto Protocol also laid down the foundation of several Market-Based Instruments (MBIs) for implementing effective emissions reduction, one of which was the Clean Development Mechanism (CDM) which allowed countries with emission reduction or limitation commitments to implement or fund carbon reduction projects in the developing world that can earn saleable and Certified Emission Reduction (CER) credits to meet the Kyoto targets. The Kyoto Protocol of 2005 played an important role in increasing awareness of emission reductions. It is since, that almost the entire world – both developed and developing regions started formulating and implementing carbon emissions standards, frameworks, and guidelines for controlling harmful greenhouse gas emissions. Carbon credit is today one of the most efficient and widely recognized offset solutions that businesses are increasingly adopting on a global scale.

Figure 3. Evolution of the Carbon Market.



Source: Deloitte Report

3.2. Compliance & Voluntary Markets

Globally, carbon markets have been successful in controlling Greenhouse gas emissions by enabling trading as a method to achieve the emission limits. There are predominantly two types of carbon markets – Compliance markets and Voluntary markets.

The compliance carbon markets are those trading platforms that are developed as part of a nation’s or a region’s obligation towards cutting down their emissions or bringing it under a defined cap, with this limit being set up by global accords like Kyoto Protocol or Paris Climate Change accord. The European Union Emission Trading System (EU ETS), Western Climate Initiative (WCI) and Regional Greenhouse Gas Initiative (RGGI) (both operating in North America) are some of the major examples of mandatory carbon markets established by the governments of those nations. Under these undertakings, countries that are signatories to accords like the Kyoto Protocol must take steps to lower their emissions. This must be done either by levying carbon taxes for goods or products manufactured through processes that emit GHGs or by setting up a mandatory carbon market in that region. The allowances or permits that form the core part of these markets are termed Compliance Emission Reduction (CER) credits.

On the other hand, voluntary markets are those in which companies or other entities take measures to lower their carbon footprint into their own hands as part of their own initiatives like CSR activities, improving their reputation, etc. Credits traded in these markets are termed Voluntary Emission Reduction (VER) credits. Compliance markets are created and regulated by mandatory national, regional, or international carbon reduction regimes and institutions. Voluntary markets function outside of compliance markets and enable companies and individuals to purchase carbon offsets voluntarily with no intended use for compliance purposes. Companies do not have any obligation to trade carbon offsets in the Voluntary markets (*Manish Dabkara and Samrat Sengupta*).

3.3. Current Global Carbon Markets

International carbon markets are playing a key role in cost-effectively reducing global greenhouse gas emissions.

The number of emissions trading systems around the world is increasing at a steady pace. Besides the EU emissions trading system (EU ETS), national, sub-national systems and regional systems are already operating or under development in Canada, China, Japan, New Zealand, South Korea, Switzerland, and the United States. Global carbon market size by region, 2019-2022 shown in Table 2. The highest number of carbon markets were found in Europe followed by North America.

Table 2. Global Carbon Market Size by Region, 2019-2022.

	2019	2020	2021	2022
Europe	2,15,894	2,60,067	6,82,501	7,51,459
UK ETS*			22,847	46,626
North America (RGGI & WCI)	22,365	26,028	51,736	62,677
China	249	257	1,289	504
South Korea	744	870	798	618
New Zealand	433	516	2,505	2,845
CERs (primary & secondary)	40	61	151	157

Source: Statista Report (2023)

Europe had the highest valued carbon market worldwide in 2022, at 751 billion euros. This accounted for nearly 87 percent of the global carbon market value that year, which increased to 865 billion euros. North America accounted for the second largest share of the total value in 2022, with a market size of 62.7 billion euros.

3.4. Carbon Markets in Paris Agreement

3.4.1. Multilateral Co-operations

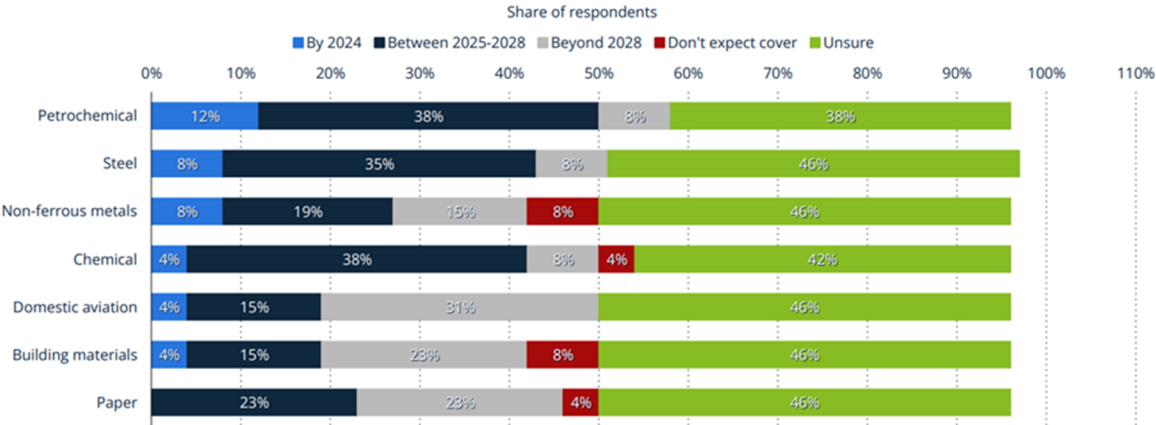
The European Commission is a founding member of the International Carbon Action Partnership (ICAP), which brings together countries and regions with mandatory cap-and-trade systems. The ICAP provides a forum for sharing experiences and knowledge. It organizes regular training courses on Carbon Trading for interested parties. The Commission also supports the development of domestic carbon markets through the Partnership for Market Readiness (PMR). The PMR is a platform for the exchange of experience on carbon market instruments and assists around 17 countries in preparing and implementing these. Recognizing the importance of international carbon markets, Article 6 of the agreement allows Parties to use international trading of emission allowances to help achieve emissions reduction targets and also establishes a framework for common robust accounting rules, and creates a new, more ambitious market mechanism.

3.4.2. Bilateral Co-operations

China

As China is the largest emitter of GHG in the world, due to its robust manufacturing sector, in 2014-2017, the European Commission in close cooperation with China carried out a 3-year project to support the design and implementation of emissions trading systems and policies in China. The project provided technical assistance for capacity building and supported the seven regional pilot systems already set up and the establishment of a national emissions trading system.

Figure 4. Projected Inclusion of Additional Industries to the Chinese ETS, 2024-2028.



Source: Statista Report (2023)

In the EU-China Joint Statement on Climate Change which was adopted at the EU-China summit in 2015, the two nations agreed to further enhance their bilateral cooperation on carbon markets. Against this background, the Commission and the National Development and Reform Commission of the People’s Republic of China agreed on a new project for 2017-2020.

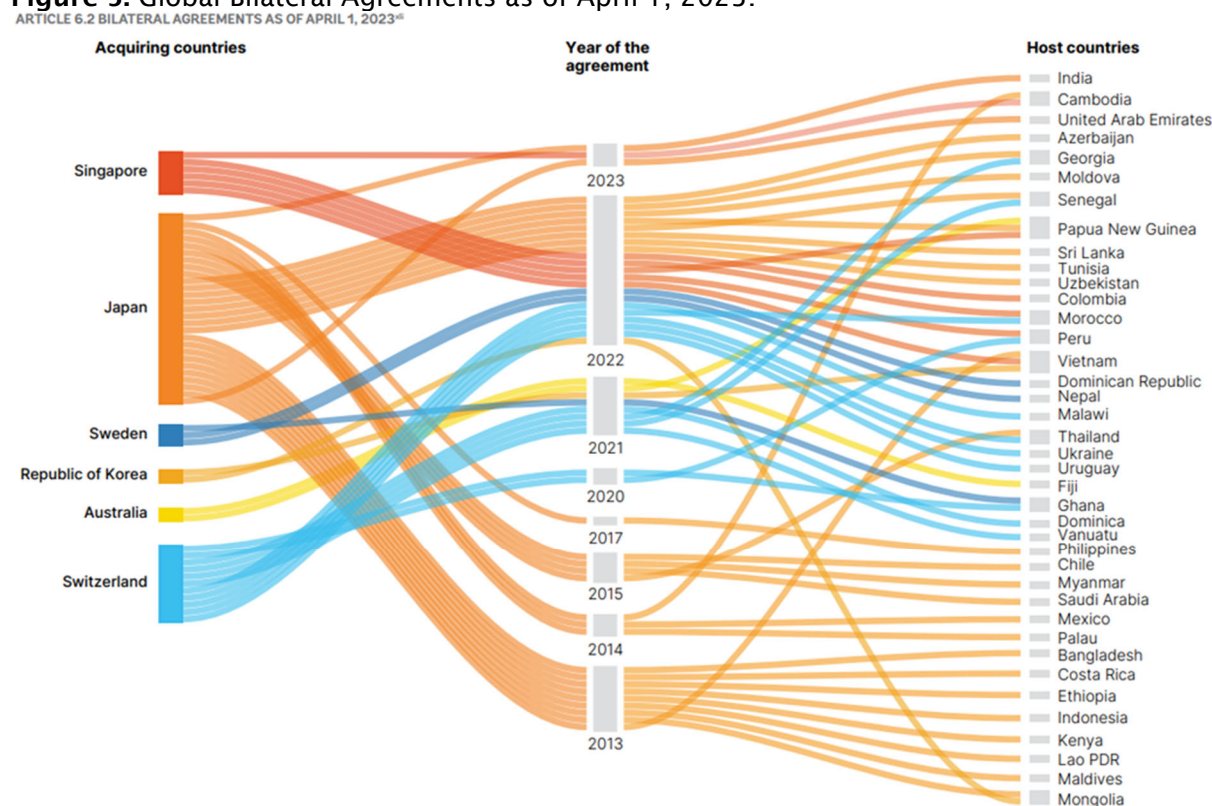
“Platform for Policy Dialogue and Cooperation between EU and China on Emissions Trading” is a project now being implemented through the cooperation. It majorly aims to provide capacity building, training, and support to Chinese Ministry authorities in their efforts to effectively implement and further develop the Chinese nationwide emissions trading system to effectively curb emissions.

The project has also established a policy dialogue between the European Commission and the Chinese Ministry of Ecology and Environment. At the EU-China summit in 2018, the EU and China signed a Memorandum of Understanding to further strengthen the cooperation on emissions trading. It provided a reinforced basis for the policy dialogue, including further forms of cooperation such as joint organization of seminars and workshops, joint research activities, and ad-hoc working groups, etc.

Korea

Multilateral Cooperation: The Korean emissions trading system (KETS) was launched in 2015 and covers around 66% of Korea's total greenhouse gas emissions. It is the first mandatory emissions trading system among countries not under Annex-I of the UNFCCC. The KETS could trigger the expansion of emissions trading among emerging economies and developing nations.

Figure 5. Global Bilateral Agreements as of April 1, 2023.



Source: World Bank Report (2023)

The European Commission supports Korea through a technical assistance project focused on building the necessary capacity to implement the KETS.

3.4.3. Linking with Other Cap-and-Trade Systems

Linking compatible emissions trading systems with each other enables participants in one system to use units from another system for compliance purposes.

Linking offers several potential benefits, including:

- reducing the cost of cutting emissions
- increasing market liquidity
- making the carbon price more stable
- leveling the international playing field by harmonizing carbon prices across jurisdictions, and
- supporting global cooperation on climate change.

The EU ETS legislation provides for the possibility of linking the EU ETS with other compatible emissions trading systems in the world at the national or regional level.

Including aviation on both sides in the scope of the linked systems, wherever possible, would also represent an essential requirement of linking.

In 2017, the EU and Switzerland signed an agreement to link their systems. The agreement entered into force on 1 January 2020 following the exchange of the instruments of ratification or approval between the EU and Switzerland.

Linking of the EU ETS and the Swiss ETS results in the mutual recognition of EU and Swiss emission allowances when surrendering allowances to cover emissions occurring as of January 2020. Switzerland keeps a separate system from the EU ETS but applies a similar scope as the EU ETS, including aviation. The EU and Australia also considered the possibility of linking their systems. However, due to the repeal of the Australian system in 2014, the linking negotiations have not been pursued (*European Commission EU Action*).

3.4.4. Current Industry Scenario

The share of global emissions covered by ETS is shown in Table 3. The results show that emissions are increasing.

Table 3. Share of Global Emissions Covered by ETS, 2005-2023.

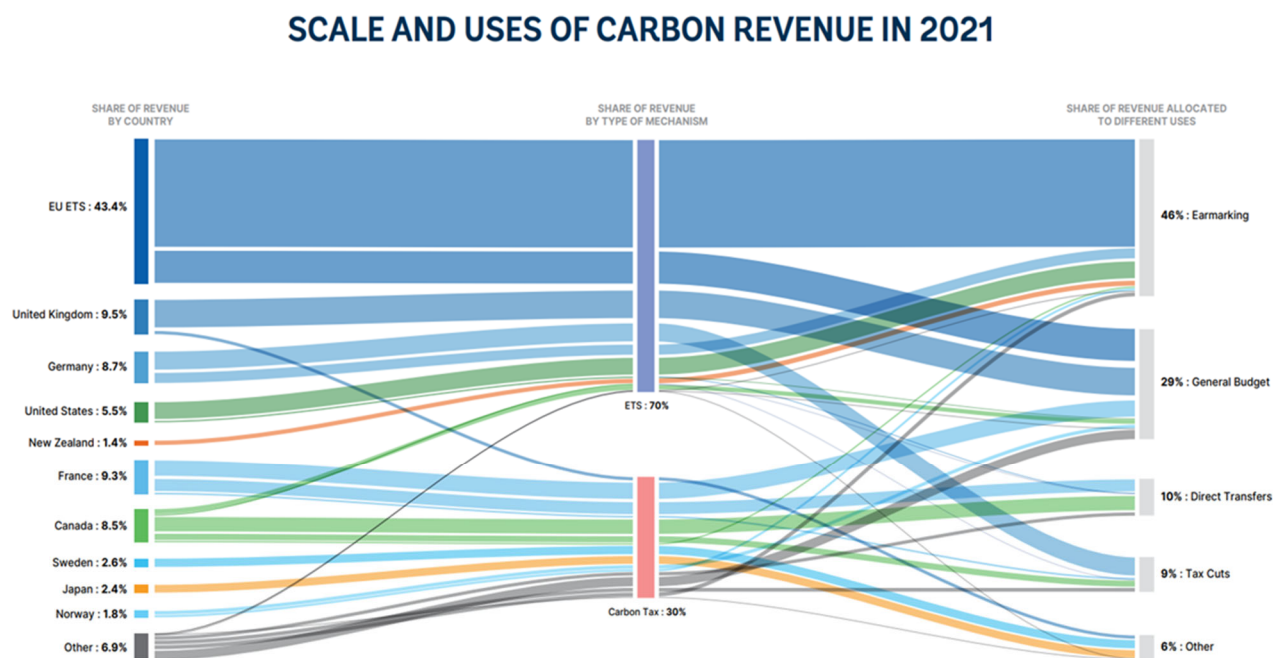
Year	Share
2005	4.50
2006	4.37
2007	4.54
2008	4.50
2009	4.50
2010	4.44
2011	4.23
2012	5.20
2013	6.42
2014	6.74
2015	7.57
2016	7.90
2017	8.11
2018	7.44
2019	7.35
2020	7.43
2021	17.11
2022	17.24
2023	17.95

Source: Statista,
<https://www.statista.com/statistics/1327202/global-ghg-emissions-covered-by-emissions-trading-systems/>

As of March 31, 2023, nearly 18 percent of global greenhouse gas emissions were covered by an emissions trading system (ETS). Between 2005 and 2020, the share of emissions covered by an ETS increased from roughly 4.5 percent to 7.4 percent. After that, coverage sharply increased in 2021, when China's national ETS first came into force. Revenues from carbon taxes and Emissions Trading Systems (ETS) have reached a record high, about \$95 billion, according to the World Bank's annual "State and Trends of Carbon Pricing" report released by the World Bank. This is despite the challenging context for governments facing high inflation, fiscal pressures, and energy crises. Today, almost a quarter of global greenhouse gas emissions (23%) are now covered by 73 instruments.

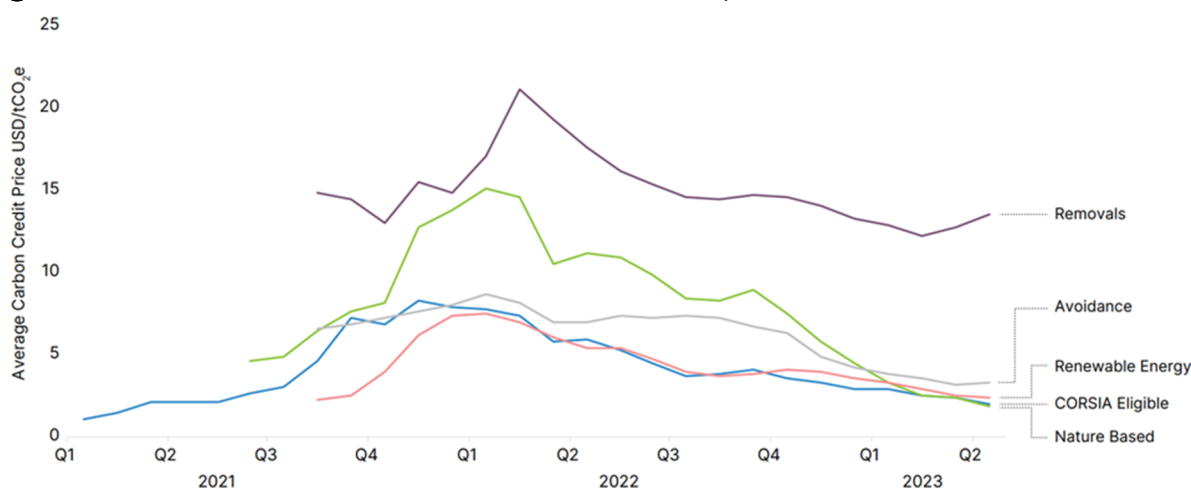
Continuing with previous trends, revenues from carbon taxes and ETSs grew by over 10% in 2022, reaching almost USD 95 billion globally. Carbon revenues are a function of the carbon price, the emissions covered, and other design features such as the method of allowance allocation or the availability of rebates. Compared to the previous year, global revenue from carbon taxes and ETSs increased by around USD 10 billion. In absolute terms, the EU ETS generated the most revenue in 2022, namely USD 42 billion, and the increase in revenues of about USD 7.8 billion was responsible for more than 76% of the total increase in global carbon pricing revenues. On a per capita basis, Sweden's carbon tax for road transport was the instrument that delivered the highest revenues, amounting to slightly more than USD 200 per citizen. In 2022, ETSs accounted for 69% of global government revenues from direct carbon pricing, with the remaining 31% from carbon taxes. There are trade-offs made between different objectives, with the amount of revenue raised dependent on design features. Many different design decisions impact the amount of revenue raised by a carbon tax or ETS, including which emissions sources are covered and how the price is set, as well as the level of baselines or free allocations, the use of auctions, the use of rebate schemes, and the use of offsets. Most of the policies that delivered the highest government revenues were ETSs, but this largely reflected higher prices and the size of the economies they covered.

Figure 6. Various Use Cases of Carbon Revenue by Countries.



Source: World Bank Report (2023), Source: <https://www.statista.com/statistics/1327202/global-ghg-emissions-covered-by-emissions-trading-systems/>

Figure 7. Prices of Standardized Carbon Credit Contracts, 2021-2023.



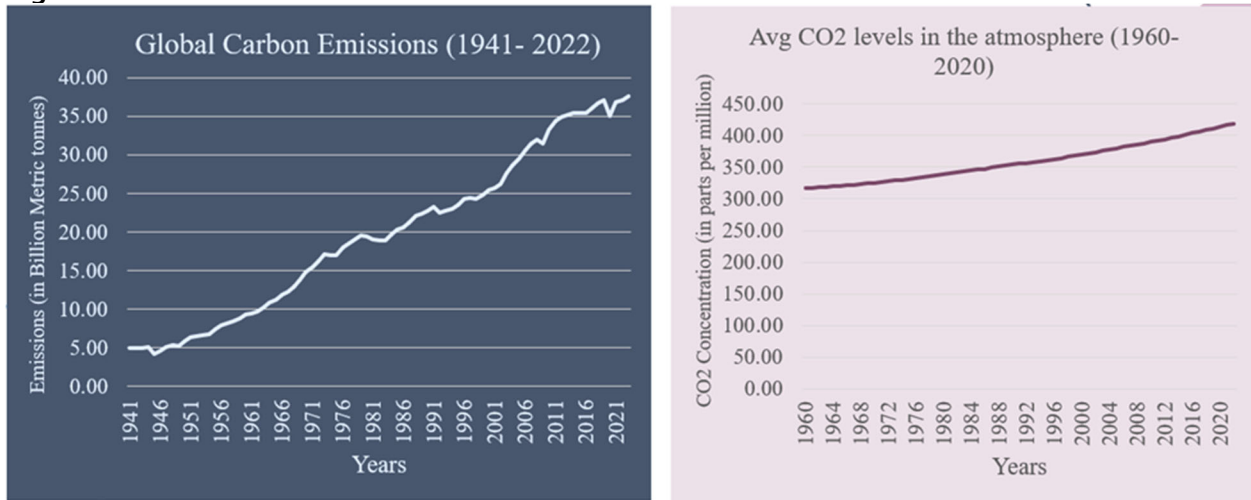
Source: Statista Report (2023)

Aside from policy changes, energy markets were the most important factor influencing prices in most ETSs. Because of limited gas supply and extremely high gas prices, coal became more competitive. Drought in Europe, China, and the United States in 2022 exacerbated the problem, causing temporary shortfalls in hydropower output and causing problems for some thermal power plants—on top of existing technical and heat-related issues, particularly among French nuclear power plants. The combined effect was sufficient in many European countries to temporarily halt the multiyear trend of decreasing coal usage, and the resulting higher power sector emissions drove up EU ETS prices. Long-term liquefied natural gas (LNG) supply contracts shielded other economies and their ETSs from energy price effects. If high energy prices persist, they will eventually affect all markets. Global energy consumption growth projections have been significantly reduced as a result of higher fossil fuel price projections. Lowering energy consumption would reduce demand for ETS allowances, lowering prices in markets where prices are determined by allowance supply and demand. Overall, carbon prices would need to rise in the long run to drive investments in climate neutrality at the scale and pace required. The High-Level Commission on Carbon Prices concluded in 2017 that carbon prices needed to be at USD 40/metric tons of carbon dioxide (tCO₂) to USD 80/tCO₂ in 2020 and reach USD 50/tCO₂ to 100/tCO₂ by 2030 to stay on track to keep temperatures below 2 °C—the upper limit agreed upon in the Paris Agreement (2017 USD). After adjusting for inflation, the price of carbon would need to reach USD 61 to USD 122 by 2030. As of April 1, 2023, a direct carbon price at or above the range recommended by 2030 (in 2023 USD) covered less than 5% of global GHG emissions, with the majority of these high-price instruments located in Europe.

The High-Level Commission on Carbon Prices report in 2017 recommended that direct carbon prices reach at least USD 40 to USD 80/metric ton of carbon dioxide equivalent (tCO₂e) in 2020 and USD 50 to USD 100/tCO₂e in real terms (in 2017 USD) by 2030 (or USD 61-122 in 2030 in 2023 terms) to limit global warming to less than 2°C, assuming a supportive policy environment is in place. Recent evaluations are consistent with the recommendations from the High-Level Commission on Carbon Prices. For example, the Intergovernmental Panel on Climate Change (IPCC) Working Group III contribution to the Sixth Assessment Report indicates that with a mitigation pathway limiting warming to 2°C, the marginal abatement costs of carbon are around USD 90/tCO₂ by 2030 in 2015 terms or USD 115 in 2023 terms.³⁷ Recently, the Network of Central Banks and Supervisors for Greening the Financial System (NGFS) released updated scenarios for central banks and supervisors in September 2022. According to NGFS modeling, carbon prices must be around USD 50 in 2010 terms by 2030 (or USD 69 in 2023 terms) and then around USD 200 (or USD 276 in 2023 terms) by 2050 to achieve a below-2°C outcome. IPCC

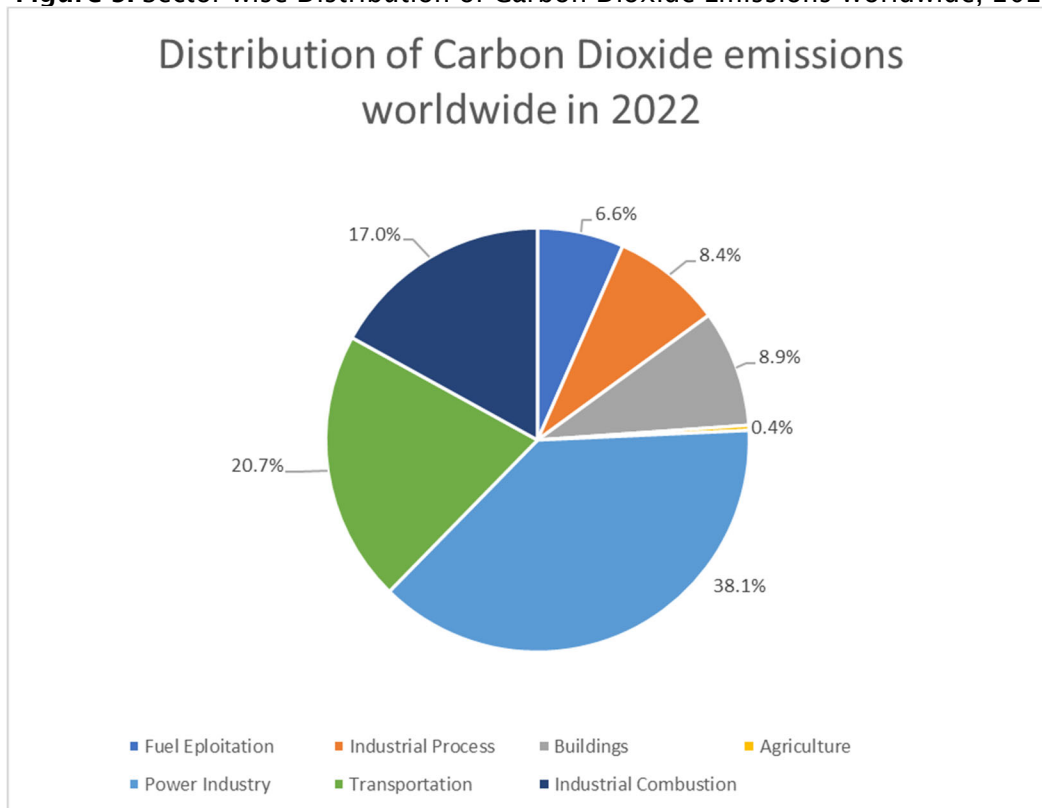
modeling (including NGFS models) concludes that significantly higher carbon prices would be needed to meet the 1.5°C requirements.

Figure 8. Global Carbon Emissions and CO2 Levels.



Source: Statista

Figure 9. Sector-wise Distribution of Carbon Dioxide Emissions Worldwide, 2022.

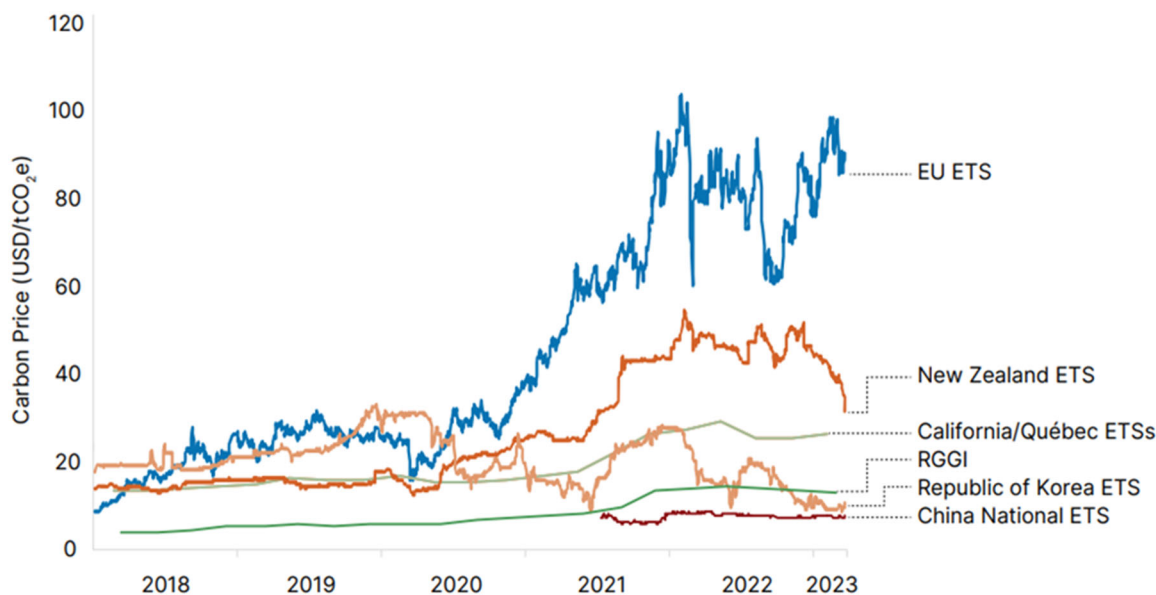


Source: Statista, *State and Trends of Carbon Pricing 2023 (English)*. Washington, DC: World Bank Group. <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099805106052321586/IDU0df4b14850029d0403c0811b0f1575605c07a#:~:text=The%20global%20energy%20crisis%20posed,pressures%20accumulated%20during%20the%20pandemic>.

Overall, countries are still falling short of the Paris Agreement's goals. Despite encouraging signs, overall climate policy ambition falls far short of what is required. The latest United Nations Environment Programme emissions gap report makes it clear that unless the global economy undergoes a large-scale transformation, the collective goal of limiting global temperature rise to 1.5°C will be out of reach. If countries' new and updated NDCs are implemented, global warming is expected to range between 2.4°C and 2.6°C. To stay on track for 1.5°C (without significant overshoot), current emissions must be reduced by 45% by 2030. The solutions to achieve the necessary transformation are well known, and the Sixth Assessment Report of the Intergovernmental Panel on Climate Change concludes that there is sufficient finance in the global system to close the respective investment gaps, however, more action is needed. The political economy of direct carbon pricing is becoming more complex in this context. The sharp rise in consumer prices, particularly energy bills, increased pressure on policymakers to consider all options for reducing cost burdens in the short term, including calls for changes to carbon taxes and ETSs in some cases. Simultaneously, the International Monetary Fund and others argued that the energy crisis highlighted the importance of promoting energy independence and achieving energy security and that adequate carbon pricing can help achieve these goals by incentivizing the deployment of domestic renewables and energy-saving measures. Revenue recycling and low-carbon investment incentives have been used to improve access to low-carbon alternatives, promote development projects, and lower the cost of living for the poor. According to various studies, direct carbon pricing can support economic development goals while not necessarily reducing economic growth or employment. The need to develop cost-effective strategies for NDC implementation, as well as the proven effectiveness of carbon pricing in reducing emissions, increase momentum for direct carbon pricing and position it as a key component of many countries' plans to meet the Paris goals.

Figure 10. Price Evolution of Carbon Credits in Various ETS, 2018-2023.

PRICE EVOLUTION IN SELECTED ETSs FROM 2018 TO 2023



Note: Based on data from ICAP Allowance Price Explorer. Prices for the RGGI initiative and for California and Québec CoT, come from the primary market, whereas for the other systems the prices reflect the secondary market

Source: World Bank Report (2023)

3.4.5. ETS, Carbon Taxes and Inflation

In 2022, global inflation is expected to be close to 8.8%. While such levels of inflation are not uncommon in many developing and emerging economies, most advanced economies had not seen them in decades. In this context, there are larger than usual differences between nominal price changes expressed in local currency and real price changes. Depending on how prices are set, inflation affects carbon tax and ETS prices in different ways. Most ETS prices are influenced by inflation; these prices are determined based on developments in other markets (including energy commodities, electricity, and so on), so price changes in these markets would affect the ETS price. A large increase in nominal prices is more modest in the EU ETS and the linked Switzerland ETS. Real declines in other markets, on the other hand, are larger than nominal changes: the 35% nominal decline in the Korean ETS is even larger in real terms, at around 40%. Several carbon taxes, such as those in Colombia and Poland, are inflation-adjusted, as are the auction floor prices in California and Quebec ETSs, which increase annually by 5% plus the rate of inflation. Because the inflation adjustment is usually applied with some lag, these instruments may still have lower real prices this year but higher real prices next year. The price in Germany's national ETS and carbon taxes in Canadian provinces, Chile, Singapore, and some European countries, on the other hand, were fixed in nominal terms. In these cases, the carbon price signal is weakened by inflation. When prices are set to rise by a predetermined amount, real increases are less than the nominal increase (*European Commission*).

3.4.6. Scenario of Agricultural Emissions

New Zealand is set to become the first country in the world to price agricultural emissions beginning in 2025, extending carbon pricing beyond traditionally covered sectors. Until now, carbon taxes and ETSs have largely focused on energy and industrial emissions: most carbon taxes apply to specific fossil fuels used for energy in various sectors, while ETSs primarily target stationary energy and large industrial facilities. The New Zealand government announced in December 2022 that the carbon price, a separate mechanism from the New Zealand ETS, would be charged at the farm level. A final round of consultations on the mechanism's design was held in late 2022, with a government decision expected in the first half of 2023. A similar approach has been proposed in Denmark, where the Danish Climate Council has proposed imposing a tax on agricultural emissions to help the country meet its emissions targets. Expanding carbon pricing to agricultural emissions presents its own set of challenges, with stakeholders concerned about the effects on food security, limited opportunities to reduce emissions from agricultural activities (and associated risks of carbon leakage), interactions with pre-existing market distortions, and difficulties ensuring robust monitoring, reporting, and verification. Others argue that customers are looking for more sustainable alternatives, that new approaches to reducing agricultural emissions are emerging, and that carbon pricing could encourage more investment in developing new ways to reduce agricultural emissions. If New Zealand's approach is successful, it will provide a useful example of how to apply carbon taxes or ETSs to agricultural emissions, as well as potentially other sectors that are not currently covered by these policies.²

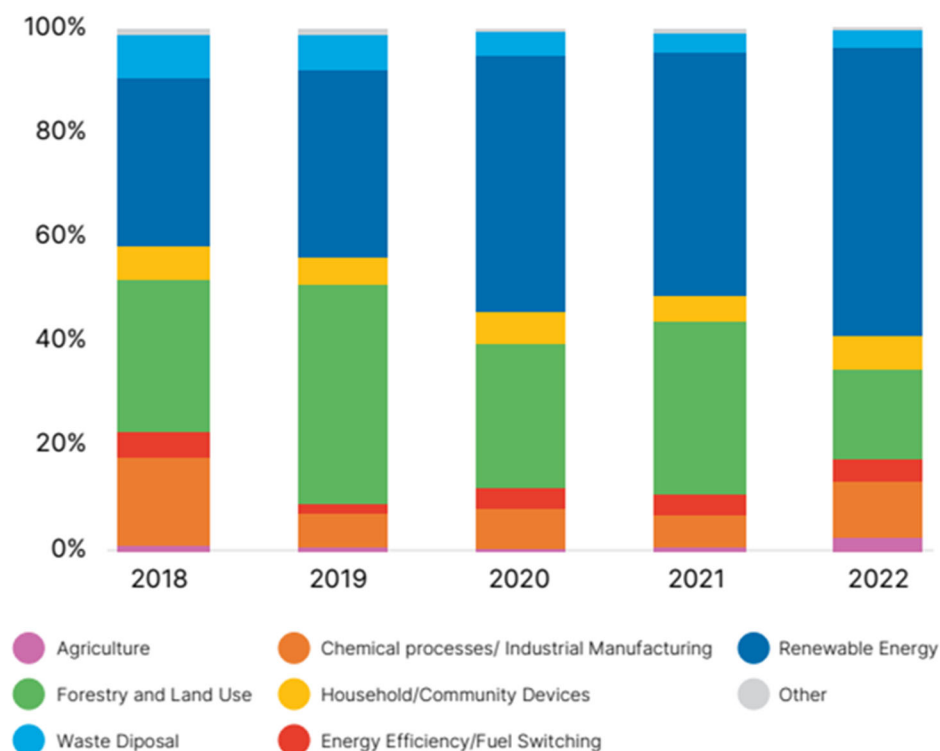
3.4.7. Global Crediting Mechanism (based on Industries)

The current supply is still focused on crediting renewable energy activities, but nature-based sources may become more important in the future. According to Ecosystem Marketplace's compilation of carbon crediting mechanism registry data, the percentage of credit issuances from renewable energy activities has generally increased since 2018, reaching 55% of credits issued in 2022. Renewable energy projects account for approximately 45% of all registered projects and have dominated supply in carbon credit markets since their inception. However, dramatic drops in renewables costs over

² Source: *State and Trends of Carbon Pricing, 2023*. Available at <https://openknowledge.worldbank.org/entities/publication/58f2a409-9bb7-4ee6-899d-be47835c838f>

the last decade mean that, in an increasing number of cases, these activities are economically appealing even without the additional revenue provided by carbon crediting. In such cases, the resulting emission reductions would not meet the financial additionality requirements. As a result, the supply of credits from new large-scale renewable energy projects is likely to decrease over time, with some independent crediting mechanisms already restricting eligibility, primarily to activities in least developed countries.⁸⁰ Instead, there has been a growing emphasis on nature-based activities, including emissions reductions from agriculture, forestry, and land use activities. These credits occasionally provide valuable co-benefits to buyers, but they also have their own distinct characteristics. While issuances of forestry and land use credits have fluctuated in recent years, with a significant drop in both absolute and relative terms in 2022, this could soon change. According to Ecosystem Marketplace, in 2022 54% of new project registrations were for forestry and land use activities, suggesting a potentially significant expansion of supply in the future (*State and Trends of Carbon Pricing, 2023*).

Figure 11. Annual Issuance of Carbon Credits by Project Category.
 PERCENTAGE OF TOTAL ISSUANCE BY PROJECT CATEGORY AND YEAR



Source: World Bank Report (2023)

IV. Challenges and Solutions

4.1. Challenges Faced by Governments

Faced with a global energy crisis and high inflation, many countries responded with relief measures, such as lowering energy prices for businesses and households through changes in energy taxes, fossil fuel subsidies, or price controls, or by making direct payments. As a result of these measures, the already high levels of government debt continued to rise. Despite these obstacles, there was continued momentum for climate action. Several high-emitting countries strengthened domestic

climate policies and targets, but global efforts continue to fall short of what is required. In this context, the political economy of carbon pricing has become even more complex.

Initiatives must be taken by developed nations to encourage developing nations to implement carbon policies. This will add to the revenue and GDP of the developing country and also act as a deterrent against Carbon Leakage. Initiatives can include financial assistance and /or technical knowledge sharing between the partners.

4.2. Carbon Credit Markets Experienced a Slowdown after Years of Rapid Growth

Carbon credit issuances and retirements fell slightly in 2021 compared to previous years, but they remain significantly higher than in previous years. Companies' voluntary demand remains the primary driver of market activity, but compliance demand may become more significant. Prices and price trends varied: prices for exchange-traded credits fell across all categories, particularly those from nature-based projects, while prices in over-the-counter transactions increased for some participants. Macroeconomic conditions, prominent critiques of carbon credits and offsets, and issuance bottlenecks are among the obvious causes of recent dynamics.

Loopholes must be exploited to overcome the bottleneck instances. Compliance markets must be further made active through stringent norms on companies to follow said guidelines. Voluntary markets should also start to rise prices to engage some effective and noticeable effects against climate change.

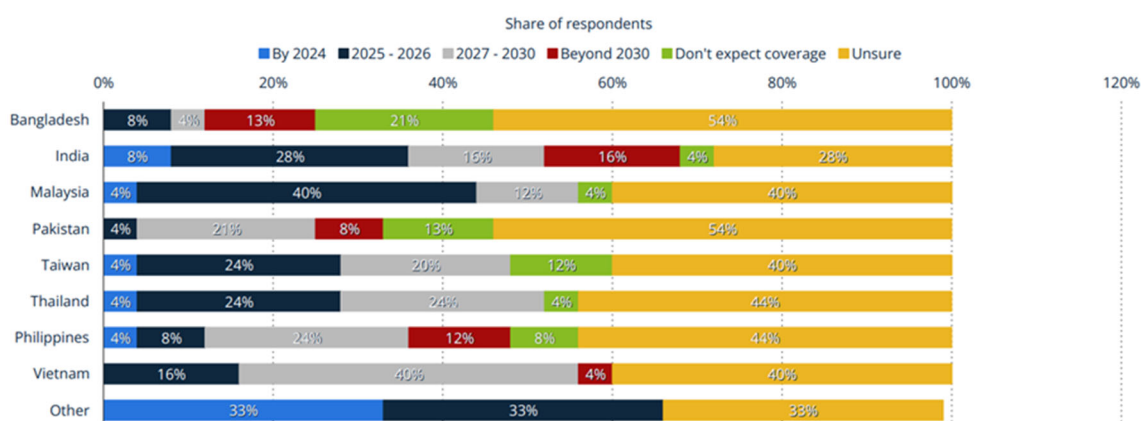
4.3. Lack of Extensive Capacity Building

Widespread participation in Article 6 will necessitate extensive capacity building. Although there is widespread interest in Article 6, particularly as a means of crowding in carbon finance to meet NDC targets, many countries lack the necessary information and institutional capacity to participate in these markets. Those with little experience with carbon crediting under the Kyoto Protocol are especially vulnerable.

Capacity building of the implementing workforce is recommended to increase their ability to exact the following of the guidelines and to impose proper action against violators of said guidelines.

4.4. Future Imperatives

Figure 12. Carbon Price Implementation Expectations in Selected Countries in the Asia - Pacific Region from 2024 to 2030.



Source: Statista Report (2023)

V. Conclusion

In the ever-evolving landscape of carbon trading, this comprehensive exploration has illuminated the multifaceted dynamics that shape the effectiveness and challenges of carbon credit mechanisms, emissions trading systems (ETSs), and carbon taxes. As we conclude, several key themes and trends emerge, reflecting the intricate interplay of environmental, economic, and political factors.

The journey of carbon trading initiated with the Kyoto Protocol in 1997, establishing the groundwork for emissions trading and market-based instruments. The Clean Development Mechanism (CDM) and the emergence of carbon markets signified a global commitment to address climate change by incentivizing emission reductions and fostering sustainable practices. Presently, carbon markets manifest in two primary forms – compliance and voluntary markets. Compliance markets, exemplified by the European Union Emission Trading System (EU ETS), operate under international accords, driving nations to meet emission reduction targets. In contrast, voluntary markets witness entities taking proactive measures to offset their carbon footprint, showcasing a diversified approach to emissions reduction. The Paris Agreement, a landmark accord, paves the way for international collaboration through Article 6, enabling countries to trade emission allowances and fostering a more ambitious market mechanism. Initiatives like the EU-China cooperation project underscore the importance of bilateral efforts in capacity building and emission reduction strategies.

The global carbon pricing landscape has seen remarkable growth, with revenues from carbon taxes and ETSs reaching unprecedented levels despite the challenges posed by inflation and energy crises. This financial influx reflects the commitment of governments and industries to adopt carbon pricing as a crucial tool for emissions reduction.

As carbon pricing gains momentum, challenges such as inflation, energy market dynamics, and the intricate balance between compliance and voluntary markets come to the forefront. The scenario of expanding carbon pricing to agricultural emissions signals a shift toward broader inclusion, presenting both challenges and opportunities for sustainable practices in traditionally uncovered sectors. While progress has been made, the world is yet to align with the ambitious goals set by the Paris Agreement. The discrepancy between current emission reduction efforts and the necessary transformative actions demands urgent attention. Direct carbon pricing emerges as a linchpin, providing economic incentives for climate neutrality and supporting the transition to a low-carbon global economy.

The number of carbon pricing mechanisms in operation worldwide shown that in 2023, the number of total national, sub-national initiatives are reasonably well. In 2023, The total number of pricing initiatives are 73. Global carbon market size by region, 2019-2022 reveals that the highest number of carbon markets were found in Europe followed by North America. The share of global emissions covered by ETS results show that increasing at increasing rate.

In conclusion, carbon trading stands at a critical juncture, poised to play a pivotal role in the collective effort to combat climate change. Through continuous innovation, international collaboration, and a commitment to sustainable practices, carbon trading can evolve into a cornerstone of a resilient, low-carbon future. The challenges are significant, but the potential for positive change remains within our grasp. The journey towards a sustainable and climate-resilient world requires concerted efforts, and carbon trading is a key instrument on this transformative path.

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Women at Work: Barriers, Penalties, and Syndromes

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Abstract

This article analyzes different barriers, penalties, and syndromes that women face in the workplace, showing different types of discrimination towards women and the problem of gender blindness. A selected collection of examples is presented. Information was obtained from published articles, international organizations, as well as media posts, especially management-related publications. Numerous examples became more visible during the COVID-19 pandemic, leading to the first female recession registered in history.

Keywords: Workplace; gender differences; gender blindness; examples; barriers; penalties; syndromes; shecession

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Regional Integration in Africa: The Role of the AfCFTA in Advancing Political Integration

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Abstract

Africa's economic prospects have always been a topic of great consternation for local governments and international analysts and commentators. A continent rich in commodities such as oil, diamonds, minerals, with favorable demographic trends, i.e., young population, and the potential for economic growth, has historically been underperforming. Throughout the years, African countries have advanced regional cooperation through the African Union (AU) and created various Regional Economic Communities (RECs) in order to improve economic growth through trade. More recently, regional economic efforts in the continent have included the Tripartite FTA and the current African Continental FTA (AfCFTA), promising to become the largest free trade area.

This article will examine the AfCFTA from a regional integration perspective and not just as a trade agreement that will produce economic benefits (like tariff reductions, trade facilitation, and economies of scale) as the latter part is known and well documented. With that in mind, the thesis of this article is whether a trade agreement like AfCFTA can lead to regional political integration for African nations.

First, we look into the current political and legal institutions in the AU, and how far regional and political integration has advanced so far. Next, the article will look into the current regional integration effort in Africa, and in particular the AfCFTA. The intent is to explore the potential to promote both further regional as well as political integration within the AU.

Finally, we assess the feasibility of achieving regional integration through the AfCFTA. Although it is still too early to tell, the AfCFTA, with its focus on trade (customs union and a common market) and with a new pan-African dispute resolution system, could be the key to both weathering global developments through further regional integration, and pave the way for future political integration.

Keywords: Regional integration; political integration; economic development; African Union; EU; African Continental Free Trade Area

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Reciprocal Trust and Opportunism: How AYNI in Peru is Used for Corruption

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Abstract

This study integrates traditional culture, communal responsibilities, and moral versus immoral individual and group behaviors by examining AYNI in Peru as a case of exchanges, implosion, and corruption.

The practice of Ayni involves mutual trust, voluntary generosity, and a spirit of altruism. The result is a system of reciprocal assistance, reflected in the organizing, participating, and enjoying collective life in the context of communities, neighborhoods, and periodic gatherings in specific locations. Predominant locations include the place of origin of the participants and distant neighborhoods where people from the same place of origin gather to celebrate traditional festivities like the day of the community patron or saint. This practice can still be observed in several rural communities in Peru.

In later decades, however, a sea change has occurred due to rural-urban migration, predominance of informal exchanges over formal ones in the economy, and the emergence of corrupt networks in the markets, political nepotism and tribalism in executive and legislative government, and biased administration of the law in Peru.

This investigation attempts to answer a fundamental social and ethical dilemma: How did a rich tradition of reciprocal and constructive exchanges turn out to be sequestered by some of its urban members to feed tribal ambitions and consequently seed corrupt organizations? The question of corruption arises when some elements of the traditional culture are employed to deceive and gain opportunistic benefits with no reciprocity, or when illegal or illicit objectives are embedded in the practice in which both ends of the relationship commit to and pursue illegal or illicit outcomes, such as deception, lying, stealing, and a network of corruption.

The empirical paper is based on extensive interviews, content analysis from published media outputs, and previous literature on the issues to elucidate the above research question. Based on an interview guide, 12 interviews in the rural area and 12 interviews in the urban area of Peru were qualitatively scrutinized with the purpose of arriving at categories and abstracted meanings of observed or narrated specific behaviors. Content analysis of acts resembling AYNI practices in the geographical covered populations was carried out relying on two national and three regional newspapers in the period of two calendar years. In addition, three TV networks broadcasting news and programs from Peru with access in the U.S. were examined daily for the same purpose.

The main results can be summarized as follows: 1) Both rural and urban residents practice AYNI on a daily basis; 2) The purposes served are almost diametrically opposed between those living in rural areas versus those living in urban areas; 3) The rural practice is similar to the ancestral tradition of AYNI, that is, it is used to reciprocate generosity and assistance; and 4) The urban practice involves both positive exchanges for some and negative outcomes, including crime and illicit acts, for others. The interviews emphasized good practice, whereas the media portrayed frequent damaging and appalling utilization of AYNI. Among the most corrupted entities resulting from the harmful practice of AYNI are government, including its three branches (executive, legislative, and judicial), social networks – some dedicated to commerce and services -, and small firms.

The social, economic, and political implications of the study are discussed.

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Sustainable Eco-centric Paradigm: A Key Mediator between Responsible Leadership and Corporate Sustainable Development

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Abstract

The organization's strategic business units and operational domains require an effective leadership approach in integrating corporate sustainable development (CSD). However, this concept remains theoretical mainly and necessitates urgent scholarly attention. This study explores how responsible leaders (RL) may contribute to transforming corporate organizations' traditional existence into sustainable development. Specifically, this study investigates the multiple direct and indirect relationships between responsible leadership and corporate sustainable development through the mediating effects of the "Sustainable Eco-centric Paradigm" and "Eco-effective Performance Paradigm." Amazon Mechanical Turk (MTurk), an online data collection platform, and Qualtrics URL are used to collect data from USA organizations. Respondents are the managerial and supervisory level employees. The study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze the data. The findings demonstrate a substantial impact of RL on CSD, mediated by both environmental and performance constructs. The study contributes to advancing understanding of RL and its influence on CSD within the critical dimensions of the 'sustainable eco-centric paradigm' and 'sustainable and eco-effective performance framework.' Theoretical and practical implications, contributions, limitations, and future research directions are discussed.

Keywords: Responsible leadership; corporate sustainable development; environmental strategy; environmental awareness; green work climate; green values; green innovativeness

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The Effects of Global Competitiveness and Macroeconomic Environment in Sustainable Development Goals and Dimensions: Global, Country Cluster, and Country Level Study

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Abstract

Sustainable development is critical to individuals, firms, regions, countries, and the world. It involves a large number of factors, huge stakes, numerous interactions and processes, many stakeholders and interests, and different perspectives. The large set of sustainable development components gives an ample opportunity to undertake numerous studies. Relationships between competitiveness, the macroeconomic environment, and sustainable development goals and dimensions are crucial for national and global policymaking. Many of these relationships have not been studied systemically nor at different aggregation levels.

This study examined the relationships among Global Competitiveness pillars (e.g., Institutions, Infrastructure, Education, Technology, Business Sophistication, and Innovation) with the Macroeconomic Environment and the 17 United Nations' Sustainable Development Goals. A diverse set of model configurations examined multiple relationships at different aggregation levels. I use 11-year data from 129 countries. In addition, this study examined three country clusters (very-competitive, competitive, and less-competitive). This study analyzed the data using partial least squares (PLS-SEM). Considering country differences and the diversity of model configurations examined, the result showed variability in the relationships studied as well as differences between countries and country clusters. Findings may be useful for policymakers in reflecting and acting on the specificity of national sustainable development, which factors to prioritize for the future, as well as reflecting and acting on the integration of national sustainable development into global sustainable development.

Keywords: Global competitiveness; macroeconomic environment; sustainable development goals

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Percepción de los estudiantes respecto al equipo de cómputo en la Facultad de Comercio, Administración y Ciencias Sociales de Nuevo Laredo

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Resumen

La tecnología ha adquirido una importancia creciente en la educación, siendo imperativa su integración en las universidades, especialmente tras la paralización de actividades causada por la pandemia global. Este estudio se centra en analizar la percepción de los estudiantes acerca del equipamiento informático en la Facultad de Comercio, Administración y Ciencias Sociales de Nuevo Laredo.

Método: La presente investigación adopta un enfoque cuantitativo con el propósito de diseñar y aplicar un instrumento de medición que permita la obtención de datos verificables. Este instrumento se utilizó para recopilar información relevante de los estudiantes en la Facultad de Comercio, Administración y Ciencias Sociales de Nuevo Laredo, centrándose en la percepción del equipamiento informático.

El análisis de los resultados permitió identificar patrones, tendencias y relaciones significativas entre las variables evaluadas. Este enfoque cuantitativo brindó una comprensión objetiva de la percepción de profesores y estudiantes en relación con el equipamiento informático en la mencionada institución.

Finalmente, la interpretación de los resultados se realizó de manera eficaz, vinculando los hallazgos con las preguntas de investigación planteadas. Este proceso metodológico proporciona una base sólida para formular conclusiones fundamentadas y contribuye a la comprensión más profunda de la influencia de la tecnología informática en la experiencia educativa en el entorno académico.

Resultados: El análisis de encuestas y gráficos revela que, a pesar de las fallas en los equipos de la facultad, los estudiantes los utilizan, destacando problemas menores como algunos mouses dañados y la encendida de algunas computadoras. A pesar de estas dificultades, muchos prefieren estos equipos sobre los personales para sus tareas.

La encuesta concluye con una clara afirmación de la necesidad de cambiar los equipos de la facultad, respaldando la hipótesis inicial. En conclusión, los resultados confirman la percepción de alumnos y docentes de la Licenciatura en Tecnologías de la Información sobre la urgencia de renovar la mayoría del equipamiento informático en la Facultad.

Palabras clave: Equipamiento computacional; estudiantes universitarios; académicos

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Aprovechamiento sustentable de los recursos naturales en el área natural protegida paisaje natural de la mariposa monarca, Tamaulipas, México

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Resumen

Los estudios realizados en las Áreas Naturales Protegidas (ANP) de Tamaulipas han revelado áreas de oportunidad significativas. Estas áreas fueron decretadas en diferentes contextos, tanto a nivel nacional como internacional, con un enfoque orientado hacia la conservación de los recursos biológicos. Sin embargo, se ha identificado un problema fundamental según el Diagnóstico del Programa U18 del Programa de Jornadas de Mejoramiento Ambiental 2023, realizado por la Secretaría de Desarrollo Urbano y Medio Ambiente de Tamaulipas: las ANP carecen de condiciones adecuadas para su restauración, protección, conservación y desarrollo sostenible. Esto se debe a la ausencia de políticas sustentables de recursos naturales.

Un adecuado manejo y aprovechamiento de los recursos naturales en estas áreas no solo promoverá el crecimiento económico de las comunidades que las habitan, sino que también garantizará la sostenibilidad de dichos recursos. Es esencial trascender la mera existencia de ANP que solo son "de papel", superando la conocida "tragedia de los comunes" señalada por Hardin en 1968. Para lograrlo, es necesario adoptar un enfoque que permita trabajar con reglas diseñadas por las propias comunidades afectadas, considerando las particularidades de cada contexto.

Bajo un enfoque multinivel, donde las interacciones y la superposición de agentes en sistemas policéntricos amplían las oportunidades para la adaptación y el aprendizaje, podemos enfrentar los desafíos en un mundo sujeto a cambios constantes y a la incertidumbre. Es crucial fomentar la colaboración y la participación de todas las partes interesadas para garantizar la efectividad de las medidas implementadas en las ANP de Tamaulipas.

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Responsabilidad Social Empresarial

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Resumen

La Responsabilidad Social Empresarial (RSE) ha emergido como un imperativo ético y estratégico en el mundo empresarial contemporáneo, influenciado por un entorno global marcado por desafíos ambientales, sociales y económicos cada vez más urgentes. En México, al igual que en otras partes del mundo, la RSE ha evolucionado para convertirse en un componente esencial de la gestión empresarial, con el potencial de generar beneficios tangibles tanto para las empresas como para la sociedad en su conjunto.

En esta introducción, exploraremos el papel crucial que desempeñan las normativas contables y los estándares de informes financieros en la integración efectiva de la RSE en la contabilidad empresarial, examinando cómo estas regulaciones influyen en el reconocimiento, la medición, la divulgación y la rendición de cuentas de las actividades relacionadas con ésta. Además, analizaremos los incentivos y reconocimientos asociados con el cumplimiento de estos estándares, así como los desafíos y oportunidades que enfrentan las empresas mexicanas en su búsqueda por adoptar prácticas comerciales más éticas, transparentes y sostenibles.

En última instancia, esta investigación busca proporcionar una visión integral de cómo las normativas contables pueden promover una cultura empresarial más responsable y orientada al bienestar social y ambiental en México.

Palabras claves: Ética; beneficio; potencial

Corporate Social Responsibility

Abstract

Corporate Social Responsibility (CSR) has emerged as an ethical and strategic imperative in the contemporary business world, influenced by a global environment marked by increasingly urgent environmental, social, and economic challenges. In Mexico, as in other parts of the world, CSR has evolved to become an essential component of business management, with the potential to generate tangible benefits for both companies and society. In this introduction.

We will explore the crucial role that accounting regulations and financial reporting standards play in the effective integration of CSR into corporate accounting, examining how these regulations influence recognition, measurement, disclosure, and accountability of activities related to CSR. Additionally, we will analyze the incentives and recognitions associated with meeting these standards, as well as the challenges and opportunities that Mexican companies face in their quest to adopt more ethical, transparent, and sustainable business practices.

Ultimately, this seeks to provide a comprehensive vision of how accounting regulations can promote a more responsible business culture oriented toward social and environmental well-being in Mexico.

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Quantile Connectedness: The Dynamics of Geopolitical Risk, Supply Chain, and the Global Economy

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Abstract

We investigate the dynamic connectedness of geopolitical risk in conjunction with global supply chain pressures, global real economic activity, and the volatility of the stock market as reflecting the dynamism of the overall global economy. The evidence shows that geopolitical-related events pose as a net transmitter of shocks to the overall global economic activity. In contrast, the series of economic activities tend to be the net receivers of shocks, with the global supply chain pressure index being the overall net receiver of shocks. The results indicate that the transmission mechanism is driven chiefly by extreme higher values with Brexit, the Russia-Ukraine war, and the COVID-19 pandemic playing a crucial role.

Keywords: Geopolitical risk; global supply chain pressures; global real economic activity; Quantile vector autoregression.

JEL Classification: C51; F02; F62; P33

I. Introduction

Geopolitical tensions have been and are always on the rise. The Ukraine-Russia crisis has brought to the forefront the essence of geopolitical uncertainties on global economic activities and security. Similar events, including the COVID-19 pandemic, political extremism, terrorism, and the Syrian refugee crisis, are equally evident (Rao et al. 2023). For instance, the COVID-19 pandemic has had a notable adverse impact on the global economy, resulting in a significant decline in commodity prices (Shahzad et al. 2023). Additionally, on February 24, 2022, with the gradual recovery of the global economy from the COVID-19 pandemic, energy prices witnessed a considerable surge following the Russian invasion of Ukraine. This serves as a clear example of the profound influence of geopolitical events on global economic dynamics. Business cycles may evolve due to the perception of geopolitical risks (Cheng and Chiu 2018). Hence, the price of assets with high volatility and the distribution of capital across countries are influenced by geopolitical dynamics. In parallel, trade flows and global supply across the globe are affected by tensions among countries through the actions of firms and the policies of governments (Caldara and Iacoviell 2022).

Many economic models suggest that adverse geopolitical events and threats can influence macroeconomic variables through different channels, such as capital stock depletion and especially supply chain operations (Caldara and Iacoviell 2022). However, the correlation of geopolitical risks with other major global economic outcomes has not been investigated systematically in empirical research. Against this backdrop, the objective of this paper is to utilize

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the recently developed quantile connectedness approach to analyze both the direction and the magnitude of the correlation between geopolitical risks and global economic activity variables. In particular, we investigate how global political risk (GPR), global supply chain pressures (GSCPI), global real economic activity (IGREA), and the Chicago Board Options Exchange's CBOE Volatility Index (VIX) influence each other. Thus, three key questions are explored: (i) The extent of connectedness in global economic activity variables and how it's affected by changes in the magnitude of GPR. (ii) Whether the impact of negative (expansionary) or positive (contractionary) changes is asymmetric. (iii) The role of each variable as a net transmitter or recipient of spillover shocks in this network of variables. The present study contributes to the existing literature on the global transmission mechanism of GPR and connectedness in the global economic activity space by incorporating a magnitude dimension.

The study offers a series of contributions to the extant literature. First, we contribute to the understanding of the transmission mechanism of shocks in the global economy. This study sheds light on how shocks propagate through the global economy and how different factors interact to amplify or dampen these shocks. This could help policymakers and investors better understand the risks associated with different events and make more informed decisions. Second, the study contributes to the literature by highlighting the importance of geopolitical risks (Caldara and Iacoviello 2022; Phan, Tran, and Lyke 2022; Antonakakis et al. 2017; Pyo 2021). The finding that geopolitical events tend to be net transmitters of shocks suggests that these events can have significant spillover effects on the global economy. This highlights the need for policymakers and investors to pay close attention to geopolitical risks and their potential impacts. Next, we also contribute to the literature by examining the role of global supply chains (Di et al. 2022). Our study finds that the global supply chain pressure index is the overall net receiver of shocks. This suggests that disruptions to global supply chains can have significant impacts on the global economy and highlights the importance of understanding and managing supply chain risks. Lastly, we contribute to the literature by identifying key events that drive the transmission mechanism. This study identifies specific events such as Brexit, the Russia-Ukraine war, and the COVID-19 pandemic as playing a crucial role in the transmission mechanism. This could help policymakers and investors better understand the potential impacts of similar events in the future and take steps to mitigate risks.

II. Data description

The data used for this study comprise the GPR and its two components, geopolitical threats (GPT) and geopolitical acts (GPA); GSCPI; IGREA; and the VIX monthly series from January 1998 to January 2023. The GPR, GPT, and GPA are based on Caldara and Iacoviello (2022)². Caldara and Iacoviello (2022) created an index to measure geopolitical risk by analyzing newspaper articles that discuss adverse geopolitical events and their associated risks. Their approach involves counting the number of articles that include risk-related terminology such as “war”, “nuclear”, “terrorist”, etc. and dividing it by the total number of articles. The resulting measure is normalized, with an average of 100 for the period between 1985 and 2019. For more details, see Caldara and Iacoviello (2022). *GSCPI* is obtained from the Federal Reserve Bank of New York.³ The index incorporates factors from various indicators that measure manufacturing activity and transportation expenses across different geographical areas. Its scale runs from 0 to 100, with higher values indicating greater strain on global supply chains.

The *IGREA* is proposed by Kilian (2009) and it assesses the global business cycle using industrial commodity markets as a basis.⁴ It derives its values from monthly information on freight rates for single voyages of dry cargo in 23 different commodities shipped from 12 nations. The measure is presented as percentage deviations from the trend. Finally, the VIX gauges the

² Geopolitical risk data can be obtained from <https://www.matteoiacoviello.com/gpr.htm>

³ Federal Reserve Bank of New York, Global Supply Chain Pressure Index, <https://www.newyorkfed.org/research/gscpi.html>

⁴ IGREA can be obtained from [Index of Global Real Economic Activity - Dallasfed.org](https://www.dallasfed.org/research/igrea/)

market's anticipated level of volatility within the next 30 days using S&P 500 index options. It involves analyzing the prices and implied volatilities of diverse S&P 500 index options with varying strike prices and expiration dates. It is frequently referred to as the "fear index" or "fear gauge" since it tends to increase when investors are unsure or uneasy about the market.⁵ These indexes are strategically chosen to reflect the dynamism of the overall global economy. Figure 1 shows the distribution of the variables across time.

Figure 1. Time series plot.

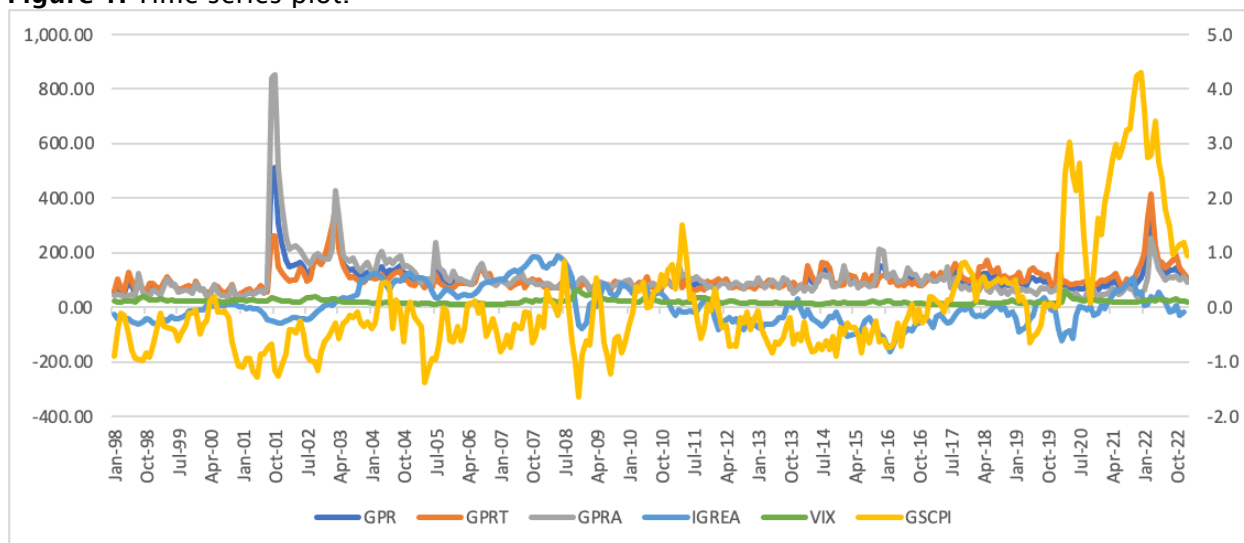


Table 1. Descriptive statistics.

	GPR	GPRT	GPRA	GSCPI	IGREA	VIX
Mean	102.082	102.01	103.639	0.000	4.666	20.589
Variance	2676.124	2006.974	6987.135	1.009	4732.328	66.680
Skewness	4.340*** (0.000)	3.112*** (0.000)	5.574*** (0.000)	2.005*** (0.000)	0.550*** (0.000)	1.821*** (0.000)
Ex.Kurtosis	26.777*** (0.000)	14.178*** (0.000)	42.506*** (0.000)	4.347*** (0.000)	-0.142 (0.722)	5.477*** (0.000)
JB	9937.254*** (0.000)	3006.764*** (0.000)	24218.346*** (0.000)	438.577*** (0.000)	15.454*** (0.000)	542.617*** (0.000)
ERS	-3.301*** (0.001)	-3.339*** (0.001)	-3.572*** (0.000)	-2.278** (0.023)	-2.469** (0.014)	-3.673*** (0.000)
Q(20)	300.384*** (0.000)	336.682*** (0.000)	324.774*** (0.000)	1022.626*** (0.000)	1073.584*** (0.000)	579.355*** (0.000)
Q ² (20)	163.039*** (0.000)	216.786*** (0.000)	157.851*** (0.000)	879.936*** (0.000)	800.096*** (0.000)	389.601*** (0.000)

Notes: ***, **, * denote significance at 1%, 5%, and 10% significance levels; Skewness: D'Agostino (1970) test; Kurtosis: Anscombe and Glynn (1983) test; JB: Jarque and Bera (1980) normality test; ERS: Elliott et al. (1996) unit-root test; Q(20) and Q²(20): Fisher and Gallagher (2012) weighted Portmanteau test statistics.

Table 1 reports the summary statistics. The statistics show that all means are positive, indicating an overall increase in these variables over the sample period. However, except for IGREA, all series are significantly right skewed, which, when combined with their significant leptokurtic distribution, suggests that the series are significantly non-normally distributed. Of greater relevance to the employed empirical methodology, there is suggestive evidence that all the series are stationary, autocorrelated, and exhibit ARCH/GARCH errors.

⁵ VIX is obtained from <https://fred.stlouisfed.org/>

III. Methods

We employ the quantile connectedness approach proposed by Ando et al. (2022) to examine the quantile propagation mechanism of GPR, GPRA, GPRT, GSCPI, IGRFA, and VIX. In order to derive all measures of connectedness, the initial step involves the estimation of a vector autoregression for quantile values, QVAR(p), which can be outlined as follows based on (Chatziantoniou, Gabauer, and Stenfors 2021):

$$y_t = \mu(\tau) + \sum_{j=1}^p \Phi_j(\tau)y_{t-j} + u_t(\tau) \quad (1)$$

where y_t and y_{t-j} are $k \times 1$ dimensional endogenous variable vectors, the quantile of interest τ is between $[0, 1]$, p represents the lag length of the QVAR model, $\mu(\tau)$ is a $k \times 1$ dimensional conditional mean vector, $\Phi_j(\tau)$ is a $k \times k$ dimensional QVAR coefficient matrix, and $u_t(\tau)$ captures the $k \times 1$ dimensional error vector with a $k \times k$ dimensional variance-covariance matrix, $\Sigma(\tau)$. To transform the QVAR(p) to its QVMA (∞) representation, we use Wold's theorem outlined as follows:

$$y_t = \mu(\tau) + \sum_{j=1}^p \Phi_j(\tau)y_{t-j} + u_t(\tau) = \mu(\tau) + \sum_{i=0}^{\infty} \Psi_i(\tau)u_{t-i} \quad (2)$$

Next, the H-step ahead Generalized Forecast Error Variance Decomposition (GFEVD) of Koop et al. (1996) and Pesaran and Shin (1998) is calculated which illustrates the impact a shock in variable j has on variable i :

$$\Psi_{ij}^g(H) = \frac{\Sigma(\tau)_{ii}^{-1} \sum_{h=0}^{H-1} (e_i' \Psi_i(\tau) \Sigma(\tau) e_j)^2}{\sum_{h=0}^{H-1} (e_i' \Psi_i(\tau) \Sigma(\tau) \Psi_i(\tau)' e_i)} \quad (3)$$

$$\tilde{\Psi}_{ij}^g(H) = \frac{\Psi_{ij}^g(H)}{\sum_{j=1}^k \Phi_{ij}^g(H)}$$

e_i captures a zero vector with unity on the i th position. This normalization leads to the following two equalities: $\sum_{j=1}^k \tilde{\Psi}_{ij}^g(H) = 1$ and $\sum_{i,j=1}^k \tilde{\Psi}_{ij}^g(H) = k$.

To ascertain the information of the overall impact variable i exerts on all other variables j , the total directional connectedness TO others is computed as follows:

$$C_{i \rightarrow j}^g(H) = \sum_{j=1, i \neq j}^k \tilde{\Psi}_{ij}^g(H) \quad (4)$$

Similarly, the impact variable i receives from the shocks of all other variables j is evaluated by the total directional connectedness FROM others:

$$C_{i \leftarrow j}^g(H) = \sum_{j=1, i \neq j}^k \tilde{\Psi}_{ij}^g(H) \quad (5)$$

The differences between the total directional connectedness towards others and the total directional connectedness from others yield the net total directional connectedness, which can be construed as the net impact that variable i exercises on the network under scrutiny.

$$C_{ij}^g(H) = C_{i \rightarrow j}^g(H) - C_{i \leftarrow j}^g(H) \quad (6)$$

Finally, the adjusted total connectedness index (TCI) of Chatziantoniou and Gabauer (2021) and Gabauer (2021) which ranges between [0, 1] is estimated as follows:

$$TCI(H) = \frac{\sum_{i,j=1, i \neq j}^k \bar{\Psi}_{ij}^g(H)}{k-1}. \quad (7)$$

TCI is commonly employed as an approximation of market risk, given that a greater TCI value corresponds to a heightened level of interconnectedness within the network (Chatziantoniou, Gabauer, and Stenfors 2021).⁶

IV. Findings and discussions

Dynamic connectedness

Table 2 presents the time-domain values, the short-term and the long-term connectedness values from the dynamic connectedness approach. Short- and long-term values are reported in parentheses. The results show that the highest own-variance share spillovers occur in the case of the VIX with 75.3%, out of which 17.5% are considered short-term own-variance spillovers while 57.8% are long-term own-variance spillovers. This means that all others account for 24.70% of the VIX forecast error variance. This implies that GPR, GPRT, GPRA, GSCPI, and IGERA affect the VIX by 5.58%, 6.42%, 5.68%, 1.74%, 5.28%, respectively.

In the event of the GPRT - which has the largest impact on the VIX - we find that 1.19% are caused by short-term spillovers while 5.23% originate from long-term GPRT. In total, we observe that the VIX influences the market by 20.18% and is influenced by 24.70%, indicating that it is a net receiver of shocks (-4.52%). More specifically, we observe that it is a short-term and long-term net receiver of shock as the short-term net spillovers are -1.69% and long-term net spillovers of -2.83%. Also, IGERA tends to influence the market by 18.66% and it is being influenced by 26.59%, making it a net receiver of shocks (-7.92%). Among these economic activity series examined, the GSCPI appears to be the main net receiver of shocks (-20.96%) with a short-term net spillover of -5.06% and a long-term spillover of -15.90%. Additionally, the GSCPI influences the market by 9.32% and it is being influenced by 30.28% with VIX being its major supplier of shocks.

It is not surprising that GSCPI has appeared as a net recipient of shocks in the overall system, given the growing trend towards economic globalization (Blanton and Apodaca 2007) and the corresponding development of the global supply chain (Qin et al. 2023; Ekinici et al. 2022). Furthermore, the shift in consumption from services to goods has exacerbated the impact of supply-driven constraints on global supply chains and trade flows. Shocks such as changes in sectoral demand are transmitted across borders through global supply chains (Di et al. 2022).

The results also reveal that GPR, GPRA, and GPRT are the major transmitters of shocks (80.79%, 69.03%, and 63.18%), respectively. On average, GPRA and GPRT tend to transmit more shocks to IGERA, GSCPI, and VIX than GRA, suggesting the critical role geopolitical-related risks play on the global economy. These findings are consistent with Qin et al. (2023), who argue that geopolitical events may trigger economic sanctions that trouble the global supply system.

Finally, the average TCI shows that the long-term dynamics are more than twice as much (30.81%) as the short-term dynamics (12.71%). Given that the average connectedness measures may obscure time-specific and time-varying effects, we analyze the dynamic connectedness plots (Chatziantoniou, Gabauer, and Stenfors 2021).

Figure 2 demonstrates the results for total dynamic connectedness. Warmer shades on the plot correspond to higher levels of connectedness. Connectedness is very strong for highly positive changes (above the 80% quantile) and for mildly lower values (below the 20% quantile).

⁶ Estimation is done using the R software program and the package Connectedness Approach by Gabauer (2022).

Table 2. Averaged dynamic connectedness table.

	GPR	GPRT	GPRA	GSCPI	IGREA	VIX	FROM
GPR	36.95 (14.78, 22.17)	27.47 (11.02, 16.45)	31.37 (11.27, 20.10)	0.68 (0.20, 0.48)	1.35 (0.28, 1.06)	2.19 (0.53, 1.65)	63.05 (23.30, 39.74)
GPRT	32.98 (11.82, 21.15)	39.89 (15.12, 24.77)	19.91 (6.47, 13.44)	1.21 (0.26, 0.95)	3.97 (0.44, 3.53)	2.04 (0.50, 1.54)	60.11 (19.50, 40.61)
GPRA	31.21 (11.66, 19.55)	16.50 (4.74, 11.76)	43.56 (17.32, 26.24)	2.89 (0.32, 2.57)	2.81 (0.63, 2.18)	3.03 (0.43, 2.60)	56.44 (17.78, 38.66)
GSCPI	4.77 (0.86, 3.91)	5.00 (0.97, 4.03)	5.88 (1.89, 4.00)	69.72 (18.12, 51.60)	5.25 (0.72, 4.54)	9.37 (2.10, 7.28)	30.28 (6.53, 23.75)
IGREA	6.25 (0.62, 5.63)	7.79 (0.89, 6.91)	6.18 (1.65, 4.53)	2.80 (0.22, 2.59)	73.41 (1.11, 72.30)	3.56 (0.27, 3.28)	26.59 (3.64, 22.94)
VIX	5.58 (1.15, 4.43)	6.42 (1.19, 5.23)	5.68 (2.10, 3.58)	1.74 (0.47, 1.27)	5.28 (0.60, 4.65)	75.30 (17.50, 57.80)	24.70 (5.52, 19.18)
TO	80.79 (26.11, 54.68)	63.18 (18.82, 44.37)	69.03 (23.38, 45.65)	9.32 (1.47, 7.85)	18.66 (2.67, 15.99)	20.18 (3.83, 16.35)	TCI
NET	17.74 (2.81, 14.94)	3.07 (-0.68, 3.76)	12.59 (5.68, 6.99)	-20.96 (-5.06, -15.90)	-7.92 (-0.97, -6.95)	-4.52 (-1.69, -2.83)	43.53 (12.71, 30.81)

Notes: Results are based on a 200-days rolling-window QVAR model with a lag length of order 2 (BIC) and a 20-step-ahead generalized forecast error variance decomposition. The first and second values in parentheses represent short- and long-term frequency connectedness measures, respectively, while all other values are the corresponding time connectedness measures.

However, lower values are stronger between 2021 and 2022. This is not surprising given the surge in geopolitical tension that emerged after Russia invaded Ukraine in the early part of 2022. Hence, the impact appears to be asymmetric. Furthermore, the 50% quantile corresponds to the total average connectedness of the entire period. Noticeably, the assumption of large and significant changes in the 50th percentile that occurred between 2018 and 2019 is also evident and expected given the US-North Korea tensions (Caldara and Iacoviell 2022) and a series of geopolitical tension such as Brexit plunging into chaos in Europe and Turkey gaining grounds in the Middle East, and a government shutdown in the United States.⁷ This suggests that there is a cyclical nature to the degree of connectedness over time. This can be attributed to the fact that connectedness is heavily influenced by specific events (Chatziantoniou, Gabauer, and Stenfors 2021).

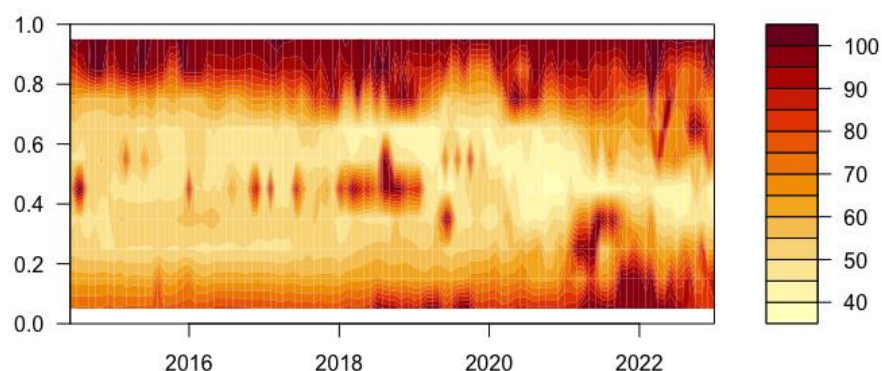
Next, we focus on the net directional results which are presented in Figures 3-8. Warmer shades on these plots indicate a net-transmitting currency. In Figure 3, it is observed that GPR assumes a net receiver in only extreme regions of quantiles (over 80%) for the period up to 2018 and between the early part of 2020 and 2022. However, for the most part, GPR assumes the role of a net transmitter in both medium and lower quantiles. Towards the end, GPR assumes both roles at extreme regions of the quantiles.

In Figure 4, GPRT acts as a net transmitter for both higher and lower quantiles while assuming both roles as a receiver and a transmitter at the onset of the COVID-19 pandemic towards the end of 2022. It is worth noting that extreme net transmitting events occurred towards the end of 2018 at the 45% and 75% quantile. This coincides with the Brexit and Middle East tensions.

In Figure 5, although GPRA generally assumes both roles as a net receiver and transmitter of shocks over time, there are episodes of extreme shock-transmitting events between the 40% and 60% until the beginning of 2019. Similarly, at extreme quantiles (80%-90%) GPRA tends to be a receiver of shocks until the beginning of 2018. Similar shock events are observed over a wide spectrum from the beginning of the pandemic till the beginning of 2022. These evidences portrays the overall global economic shocks that occurred as a result of the series of events such as Brexit, the COVID pandemic, and the invasion of Ukraine by Russia.

Finally, turning to Figures 6-8, it is observed that GSCPI, IGREa, and VIX assume an overall role as net receivers. However, a pattern of shock transmission is observed from the onset of the pandemic till the beginning of 2022. For example, we observe that GSCPI and VIX serve as net transmitters at high quantiles while IGREa serves as a net transmitter at lower quantiles, although there are episodes of both roles in all three series over time. This evidence supports prior literature (Caldara & Iacoviell, 2022; Rao et al., 2023), which shows that geopolitical events negatively affect economic activities and stock market returns.

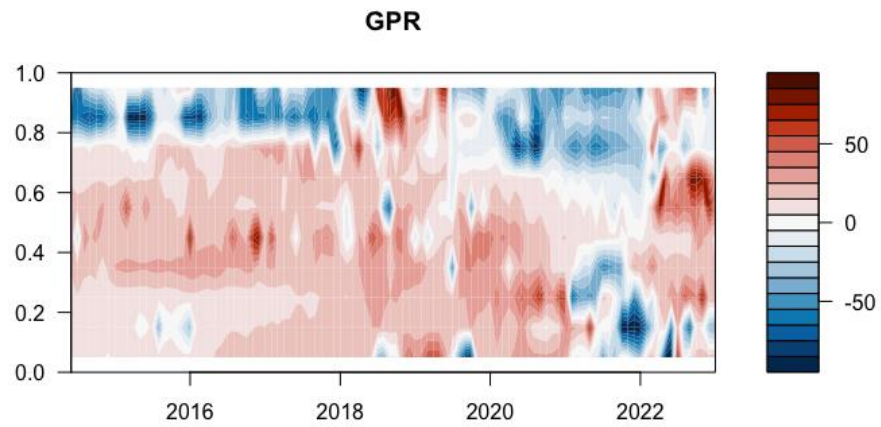
Figure 2. Dynamic total connectedness.



Notes: Results are based on a 200-days rolling-window QVAR model with a lag length of order 2 (BIC) and a 20-step-ahead forecast.

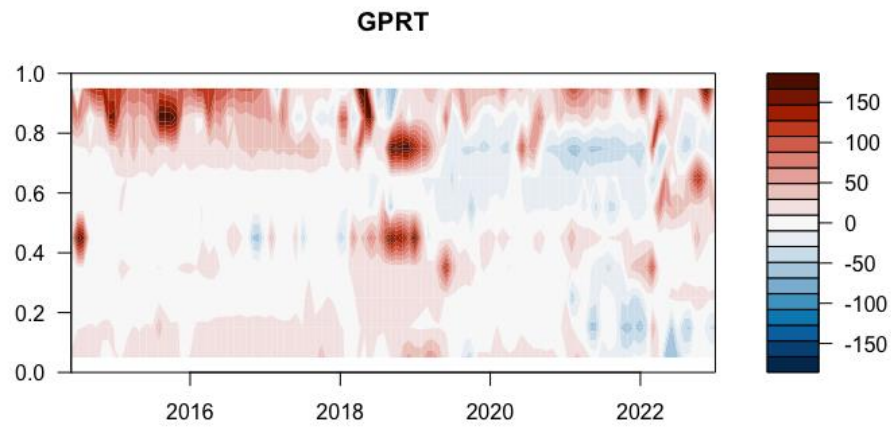
⁷ Series of geopolitical tensions between 2018-2019 <https://angelowijaya.medium.com/5-geopolitical-events-to-watch-closely-in-2019-9460d266975f>

Figure 3. Net total directional connectedness (GPR).



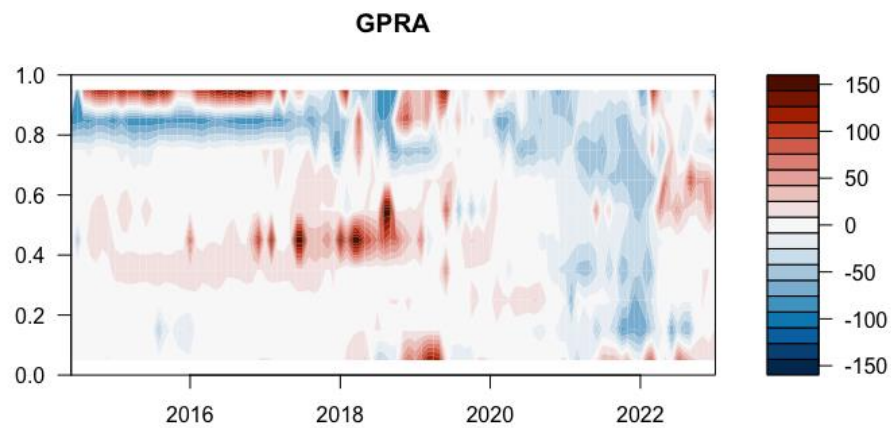
Notes: See notes in Figure 2.

Figure 4. Net total directional connectedness (GPRT).



Notes: See notes in Figure 2.

Figure 5. Net total directional connectedness (GPRA).



Notes: See notes in Figure 2.

Figure 6. Net total directional connectedness (GSCPI).

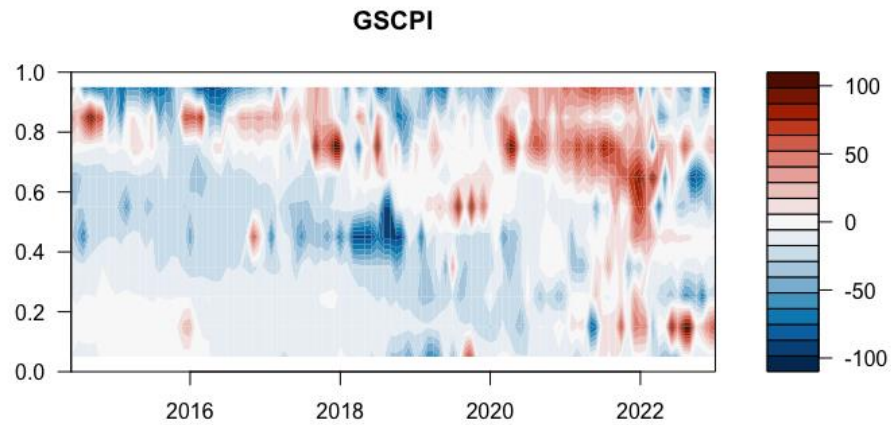


Figure 7. Net total directional connectedness (IGREA).

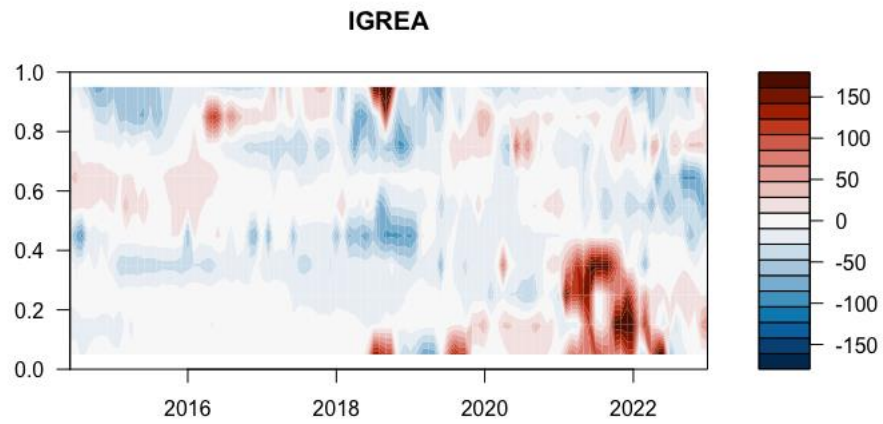
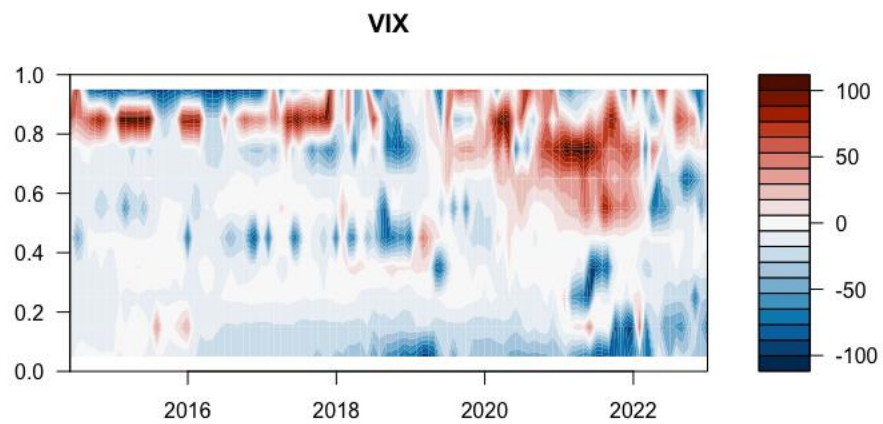


Figure 8. Net total directional connectedness (VIX).



4.2 Rolling window regression

In this section, we provide evidence using rolling regression. Rolling regression is a statistical method commonly used in empirical studies to examine the stability of statistical relationships over time. The method involves estimating regression parameters using some fraction of the data early in the sample and then “rolling” the fixed fraction through the sample so that the estimated regression parameters may vary over time. This intuitive procedure is one of the conventional methods used to examine the stability of statistical relationships over time (Cai and Juhl 2022; O’Reilly and Whelan 2005). Although the dynamic connectedness presented earlier shows time-varying effects, it does not provide enough information about the stability of the relationships observed. Hence, using the rolling regression over different time intervals to examine how the relationships may have changed is important in this setting. With GSCPI being the overall receiver of shocks, we use it as the response variable of interest while the remaining variables serve as predictor variables. The rolling regression is specified as follows:

$$y_t = x_t^T \beta \left(\frac{t}{T} \right) + \epsilon_t \quad (8)$$

where β is a $p \times 1$ vector of integrable functions defined in $[0, 1]$, so that the regression parameter varies over time as T increase. The quantity of interest, $\beta \left(\frac{t}{T} \right)$ in the rolling window is then specified as follows:

$$\bar{\beta}_r = \frac{1}{\lambda} \int_{r-\lambda}^r \beta(u) du \quad (9)$$

The population parameter of interest is captured by λ and r which represents the average of the coefficients at point r given a rolling window fraction λ . We followed O’Reilly and Whelan (2005) and Cai and Juhl (2022) to estimate an AR(2) for a sequence of rolling samples and calculated the average unbiased estimates (thick black line) with a 95% confidence bands (gray areas) using the grid-bootstrap procedure. For brevity, we present the results in Figures 9-11.

In Figure 9, we presented evidence using twelve months rolling window. The results show an average stability effect over time, with GSCPI being partially sensitive to all the predictors. For instance, we observe a mild sensitivity of GSCPI to GPR between 2000 and 2019 but large negative persistence and sensitivity after the onset of the pandemic. A similar effect is observed in GPRT and GPRA. Worthy of note is the large sensitivity of GSCPI to all three political risks between 2007 – 2010, which can be attributed to the global financial crisis. However, for IGREA, a large persistence sensitivity of GSCPI is observed in the 2000s and post-2020. Key attributable events are the September 9 terrorist attack and the COVID-19, respectively. Lastly, VIX shows a continuously large sensitivity over the period suggesting the responsiveness of GSCPI to the financial market. This evidence also supports the earlier result of VIX being the major supplier of shocks to GSCPI.

Figures 10 and 11 show the results using seventy-two and one-hundred- and forty-four-month rolling window, respectively. Interestingly, the sensitivity of GSCPI to all predictors is constrained to almost zero until the advent of the pandemic with GPRT, GPRA, IGREA, and VIX having a positive effect while GPR shows a negative impact. The results show that the responsiveness of GSCPI to all predictors is almost stable over time in large windows except during the pandemic.

More importantly, in Figure 11, we observe that while the sensitivity of the three measures of political risks is pointing towards zero (stability), the sensitivity of IGREA and VIX is continuous on an upward trend. This evidence helps shed more light on the dynamic connectedness among these variables and shows that the responsiveness of GSCPI to the effect of the other predictors varies over time with large positive and negative sensitivity during the pandemic.

Figure 9. Twelve-month rolling window.

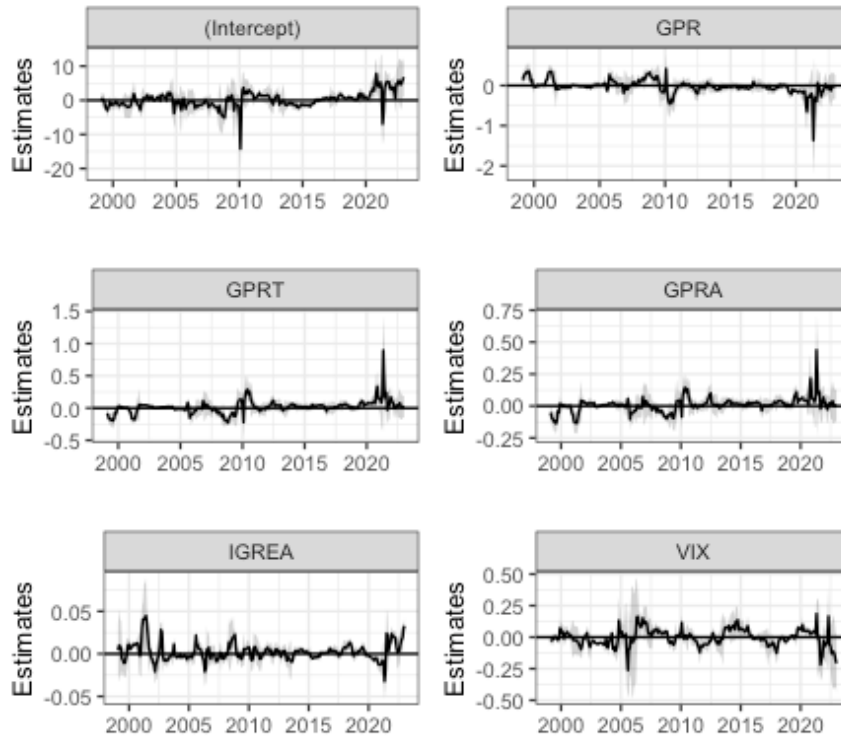


Figure 10: Seventy-two month rolling window.

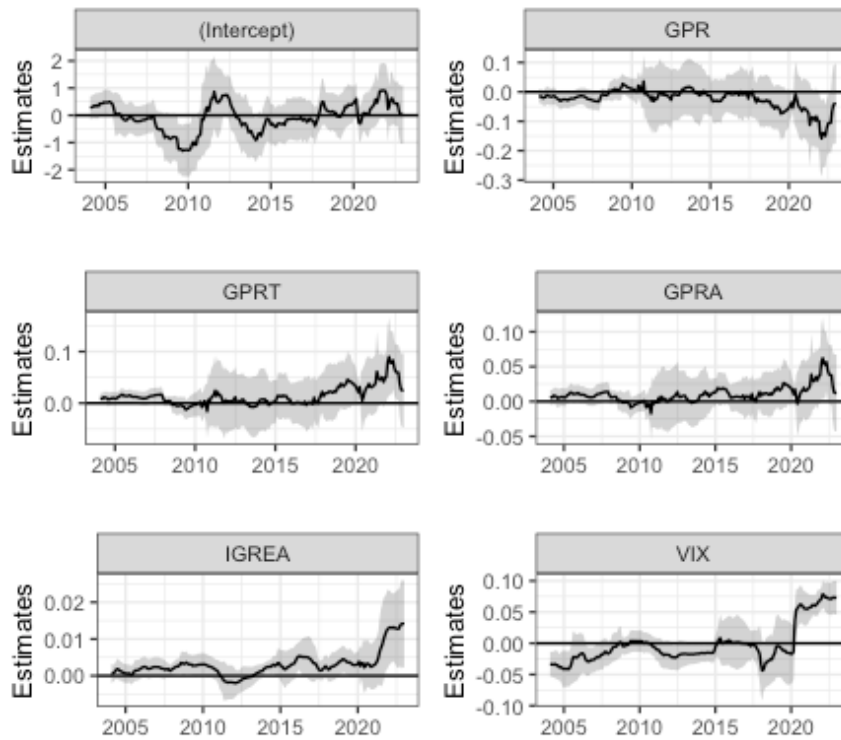


Figure 11. Forty-four month rolling window.

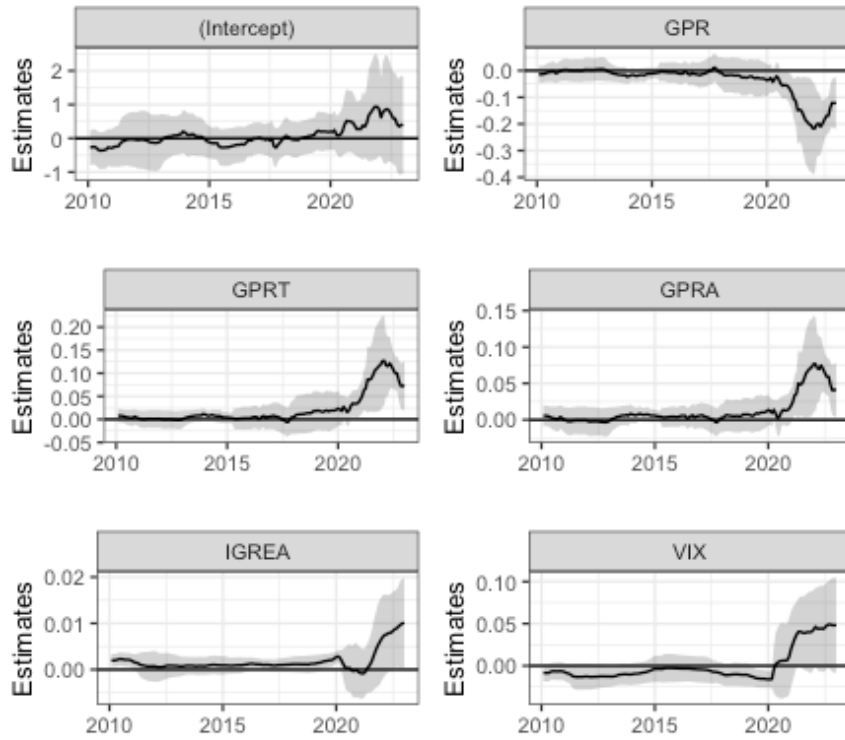
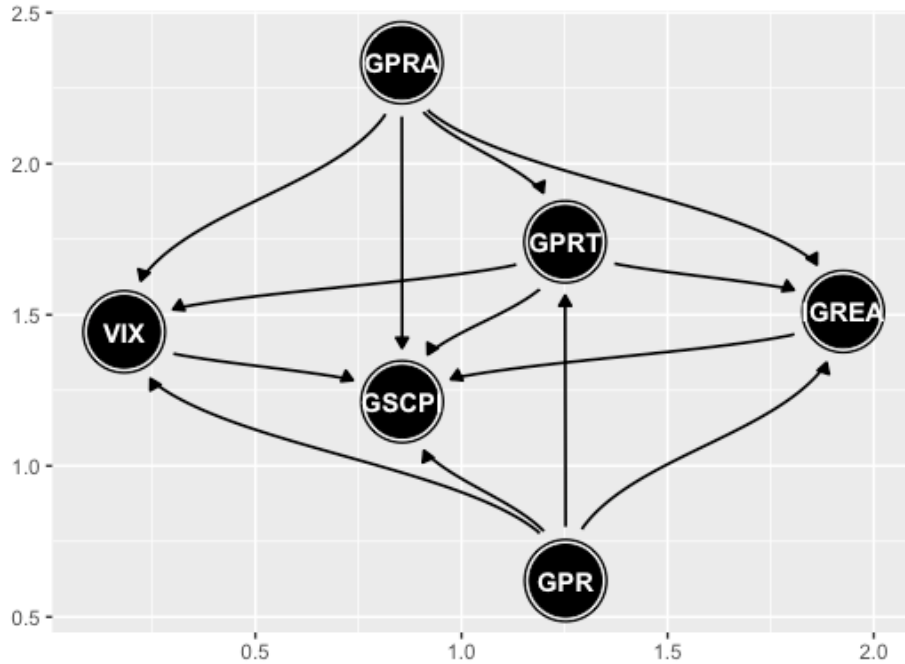


Figure 12. Contemporaneous causal flow patterns using directed acyclic graphs.



One important question still remains. That is, is the above effect causal? To ascertain whether the responsiveness of GSCPI to the other predictors is causal or not, we use the directed acyclic graphs (DAG) approach to explore the important contemporaneous causal pattern among GSCPI, VIX, IGERA, GPR, GPRT, and GPRT. The DAG technique is a tool that is used to conduct a data-determined structural decomposition of the VAR analysis (Yang and Zhao 2014) to illustrate the causal structure of the evidence presented above. The conventional VAR analysis which is based on Cholesky decomposition to achieve a just-identified system in contemporaneous time has been heavily criticized for imposing strict and unrealistic assumptions (For details, see Yang & Zhao, 2014). Hence, the DAG approach offers a specific and data-determined pattern for the structural decomposition of VAR residuals.

Due to space limitations, we present the evidence from this analysis in Figure 12. The results show that VIX, IGERA, and GSCPI are caused by all three measures of global political risk, with most of the causal patterns directed toward GSCPI. This evidence is also confirmed using the Granger-causality test (not reported).

V. Conclusion

Using a quantile connectedness approach, we present evidence on how geopolitical events and global economic activities correlate. The approach adopted allows for a considerably more refined examination of how geopolitical risks, global economic activities, supply chain, and stock market shocks influence each other. The evidence shows that not only do these variables serve as net transmitters/receivers over time, but also extreme values drive their respective roles. Contrary to most empirical evidence that finds symmetry in the transmission framework, the evidence shows that geopolitical events and economic activities are not symmetric.

Examining these factors is of great importance to policymakers and businesses as they navigate the complex landscape of the global economy. By understanding the connection between these factors, companies can effectively anticipate and mitigate risks while identifying opportunities for growth and investment. Consequently, it is essential to recognize the implication of these factors as critical indicators for informed decision-making in today's ever-evolving global economic environment.

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What Factors Drive Cross-Country Economic Freedom Convergence?

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Abstract

We investigate the convergence dynamics of economic freedom across 119 countries to show that relative and weak σ -convergence tests indicate non-convergence of economic freedom across all countries. However, club convergence tests reveal three distinct converging clubs. The results from an ordered logit model demonstrate that countries belonging to the higher economic freedom convergence clubs are less likely to have French legal origin and reliance on natural resource rents, and more likely to have long tenured and democratic governments, easier exitability, more net migration, faster economic growth, more control of corruption, as well as educated, elderly, and dense populations.

JEL Codes: C12; C23

Keywords: Economic freedom; institutions; legal origins; convergence; club convergence

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Strategic Orientations and Firms' Global Financial Performance

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Abstract

Strategic orientation of firms often comes to the fore of scholars and practitioners as this is considered one of the pivotal determinants of firms' sustainable competitive advantage and global financial performance. Although strategic orientation is one of the most pronounced topics in strategic management and marketing, existing literature on strategic orientation is narrowly focused based on few strategic aspects that fail to capture the complex and dynamic nature of the strategic orientation of firms and examine their pervasive impacts on firm performance. By synthesizing and integrating extant literature from strategic management and marketing, this study introduces five dimensions of strategic orientation, using objective data over two decades, drawing on multiple theoretical perspectives (e.g., resource-based view, dynamic capability, and absorptive capacity). We also emphasize the interaction effects of these dimensions on firm global performance by adopting Gestalt theory. Results indicate that dimensions of strategic orientation and their interactions have a significant effect on firms' global financial performance. We offer important theoretical and managerial implications along with future research directions.

Keywords: Strategic orientation; resource-based view; dynamic capability; absorptive capacity; Gestalt theory; global financial performance.

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Intangible Assets and Unsecured Debt

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Abstract

This paper investigates the impact of intangible assets on unsecured debt of U.S. firms. We document a positive relation between intangible assets and unsecured debt. This finding is robust to possible endogeneity concerns. We further explore the underlying mechanisms and find strong evidence that the positive relationship between intangible assets and unsecured debt could be attributed to firms' demand to preserve collateral capacity and to maintain financial and/or operational flexibility. The results collectively indicate the importance of intangible assets on firms' debt financing decisions.

Keywords: Intangible assets; unsecured debt; collateral; flexibility

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Forward Exchange Market Transitional Policy Modeling: The Case of the Japanese Yen

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Abstract

This study provides insight into the theoretical foundation of the forward exchange market aspects for the current gradual pivot of the Bank of Japan away from its unconventional expansionary monetary policies. These policies include depressed interest rates that were aimed at propping up inflation, depreciating the yen, and encouraging economic growth. This combination allowed the “yen carry trade” where investors borrowed in yen and invested (mainly) in US denominated assets. To address the emergence of a tighter monetary policy stance with higher interest rates that combat a more inflationary environment, the paper develops a dynamic continuous time model of the forward exchange market for the trading of the Japanese yen and the US dollar. We simulate the nonlinear model that captures the reactions of interest rate arbitrageurs and their interactions with the reactions of speculators/traders in the forward exchange market. The analysis also builds a linearized companion system that is used to explore the optimal tracking control of the forward exchange rate when the central bank uses the market interest rate as a policy variable to optimally transition toward a yen appreciation.

Keywords: Forward exchange market; economic policy; Japan

JEL Classifications: C61; E47; F31; F37

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How Do Banxico's Monetary Policy Announcements Affect Firms' Inflation Expectations?

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Abstract

This paper investigates whether firms' 12-month inflation expectations react or not to Banxico's monetary policy announcements (*MPAs*) that result either in surprises of monetary policy or in interest rate changes. I use the date and hour in which each participant firm in Banxico's Monthly Survey of Regional Economic Activity submits its responses on inflation expectations to the questionnaire in order to analyze whether the inflation expectations of those that responded right after the *MPA* differ from those that responded right before it. The general results show that firms, despite being considered in the literature as similar decision-makers, have very heterogeneous inflation expectations and, therefore, very different responses to Banxico's *MPAs*. On one hand, the findings on the group of firms that report point estimates for the inflation rate show that they are inattentive to inflation dynamics, which is in line with the empirical literature. On the other hand, the results of the two groups of firms that report either three or five scenarios for the inflation rate and that assign probabilities of occurrence to each of them show that they do react to Banxico's *MPAs* that result either in monetary policy surprise or in an interest rate change. Their response even comply with economic theory and with that of more informed market participants. These findings are particularly evident in the North and Centre of Mexico; in the non-manufacturing sector; and in medium and large firms.

Keywords: Monetary policy; central bank communication; firms' expectations; inflation; survey data

JEL codes: E52; E58; D84; E31; C83

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Exotic Structured Products – The Case of Victory Certificates

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Abstract

We introduce and describe a financial product referred to as Victory Certificates and show, based on option pricing theory, that the payoff of an uncapped Victory Certificate can be duplicated by the combination of a long position on the underlying asset, a short position on zero coupon bonds, and a long position in up-and-in put options on the underlying asset, while a capped Victory Certificate can be duplicated by a long position in the underlying asset, a short position on zero coupon bonds, a long position in up-and-in put options on the underlying asset, and a short position on call options on the underlying asset. We also empirically examine an uncapped Victory Certificate issued by Sal. Oppenheim jr. & Cie. KGaA that was issued in April 2005 and a capped Victory certificate issued by Commerzbank AG issued in May 2010 to investigate if the issuers made a profit in the primary market. Consistent with previous research on structured products, issuers generate considerable profit in the primary market. Finally, we simulate the sensitivities of Victory Certificates to changes in different pricing input variables and parameters used in the design of Victory Certificates.

Keywords: Victory certificates; structured products; option pricing; barrier options; exotic options

JEL Classification: G13; G24

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Desigualdad en el trabajo: Efectos en la satisfacción laboral y el rendimiento empresarial

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Resumen

La desigualdad en el entorno laboral es un tema crucial que puede tener impactos significativos en el bienestar de los trabajadores y en el rendimiento de la empresa. Por esta razón, se llevó a cabo un estudio para investigar la relación entre la percepción de la desigualdad económica dentro de una organización y varios aspectos importantes, como la satisfacción laboral, la deshumanización organizacional y la auto-objetivización.

Se diseñó y distribuyó un cuestionario en línea. La muestra está conformada por 413 participantes de los cuales 248 fueron hombres (60.04%), 162 mujeres (39.22%) y 3 participantes no se identificaron con ninguno de los anteriores, todos se encuentran laborando actualmente. Las variables analizadas incluyeron la desigualdad económica, la satisfacción laboral, la deshumanización organizacional y la auto-objetivización.

Los resultados revelaron que la percepción de desigualdad económica dentro de la organización se correlaciona positivamente con la deshumanización organizacional y la auto-objetivización. Además, se encontró una correlación negativa entre la desigualdad económica y la satisfacción laboral. Interesantemente, se descubrió que la relación entre la desigualdad económica y la satisfacción laboral estaba mediada por la auto-objetivización laboral, pero no por la deshumanización organizacional.

Estos hallazgos subrayan la importancia de abordar la desigualdad económica en el lugar de trabajo, ya que puede tener consecuencias negativas tanto para los empleados como para la empresa en su conjunto. Comprender qué variables están relacionadas con la insatisfacción laboral y la disminución del bienestar de los trabajadores es fundamental para implementar estrategias efectivas que promuevan un ambiente laboral más equitativo y aumenten la productividad y la satisfacción laboral.

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Evolution of the Wages in the Automotive Industry in Mexico 3 Years After the Negotiation of the Mexico, United States, and Canada Trade Agreement

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Abstract

The goal of this study is to analyze the evolution of salaries, 3 years after the celebration of the T-MEC in the automotive sector of Mexico through a qualitative and descriptive methodology, using secondary data. The results show that average salaries in the IAM have evolved from 50 to 54.8 pesos per hour between 2019 and 2021 and 58.5 pesos per hour (2.9 dollars per hour) in 2022. This is equal to an annual increase of 3.8% and accumulative of 11.5%. Despite this effort, the wage difference between the Mexican industry and the one of the United States and Canada has not been reduced in recent years. Therefore, it is convenient to highlight that Mexico continues to have wages below what is stipulated by the TMEC, 16 dollars per hour, in the assembly of cars destined for export to the United States and Canada.

Keywords: Competitiveness; working conditions; social dumping; T-MEC; vehicles

Evolución de los salarios en la industria automotriz en México a 3 años de la negociación del Tratado Comercial entre México, Estados Unidos y Canadá

Resumen

El objetivo de este estudio es analizar la evolución de los salarios a 3 años de la celebración del T-MEC en el sector automotriz de México mediante una metodología cualitativa y descriptiva, utilizando datos secundarios. Los resultados muestran que los salarios promedio en la IAM han evolucionado de 50 a 54.8 pesos por hora entre 2019 y 2021 y 58.5 pesos por hora (2.9 dólares por hora) en 2022. Esto es igual a un incremento anual de 3.8% y a un acumulado de 11.5%. A pesar de este esfuerzo, el diferencial salarial entre la industria mexicana y la de Estados Unidos y Canadá no se ha reducido en estos años. Por lo que es conveniente destacar que México sigue teniendo salarios por debajo de lo estipulado por el TMEC, 16 dólares por hora, en el ensamble de autos destinados a la exportación a Estados Unidos y Canadá.

Palabras clave: Competitividad; condiciones laborales; dumping social; T-MEC; vehículos

I. Introduction²

Mexico has attracted the attention of large international and national investors, as a potential country for the implementation of vehicle plants in such a way that it has positioned itself among the first producers of cars and auto parts worldwide, being the seventh producer of vehicles and

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² This document is the result of the project Analysis of the factors that determine the evolution of salaries in the automotive industry in Mexico after the entry into force of the T-MEC with SIP registration number: 20232039.

the fourth largest exporter only behind Germany, Japan and the United States and is the fifth largest producer of auto parts in the world (behind China, the United States, Japan and Germany) in the world (ECLAC, 2019; Durán, 2022).

The above has brought with it economic growth and development because the Mexican Automotive Industry (IAM) is one of the main industries with the greatest contribution to GDP. According to De Villamor (2020), this sector represents 3% of the country's GDP and 18% of manufacturing production. In addition, it is responsible for around 1.9 million jobs and accounts for 32% of the country's total exports. At the international level, growth has increased significantly since the entry into force of the North American Free Trade Agreement (NAFTA). While in 1993 the sector's exports were 10 billion dollars, in 2020 they were 148 billion dollars.

However, this significant growth has not brought the expected effect in terms of salaries. For García Pureco (2018):

In terms of wages that are tied to manufacturing, Mexico also has one of the lowest wages, especially when compared to those paid in countries like the United States. In 2007 in Mexico, they paid 2.49 dollars an hour, while, in the same year, but in the USA they paid 17.27 dollars an hour, in Mexico they paid 6.93 times less for the same manufacturing activity. The situation worsened by 2017, because while in Mexico they paid 2.28 dollars per hour, in the USA they paid 20.90 dollars per hour; that is, 9.15 times less for the same work. The growth rate of wages paid in the Mexican manufacturing industry was negative (1.5%).

The above shows according to Covarrubias (September 2022):

The increase in salaries has not kept pace with the economic growth of the automotive sector. In the 25 years of NAFTA, workers in the automotive industry went from receiving 1.9 to 2.6 dollars per hour. After two and a half decades of that trade agreement, wages grew by less than a dollar. On the contrary, although productivity in Mexico has grown gradually in recent years, the evolution of wages has been almost null, except for the increase in wages on the northern border as of January 1, 2019.

The signing of the New Mexico-United States-Canada treaty (T-MEC), which came into force on July 1, 2020, contemplates several new features such as the labor chapter that discusses the salary status of workers in the IAM, for example, Workers are required to earn at least \$16 an hour. This scenario opens the possibility of a salary increase; What is the evolution of salaries in the IAM 3 years after the celebration of the T-MEC? The objective of this study is to analyze the evolution of salaries 3 years after the celebration of the T-MEC in the automotive sector of Mexico.

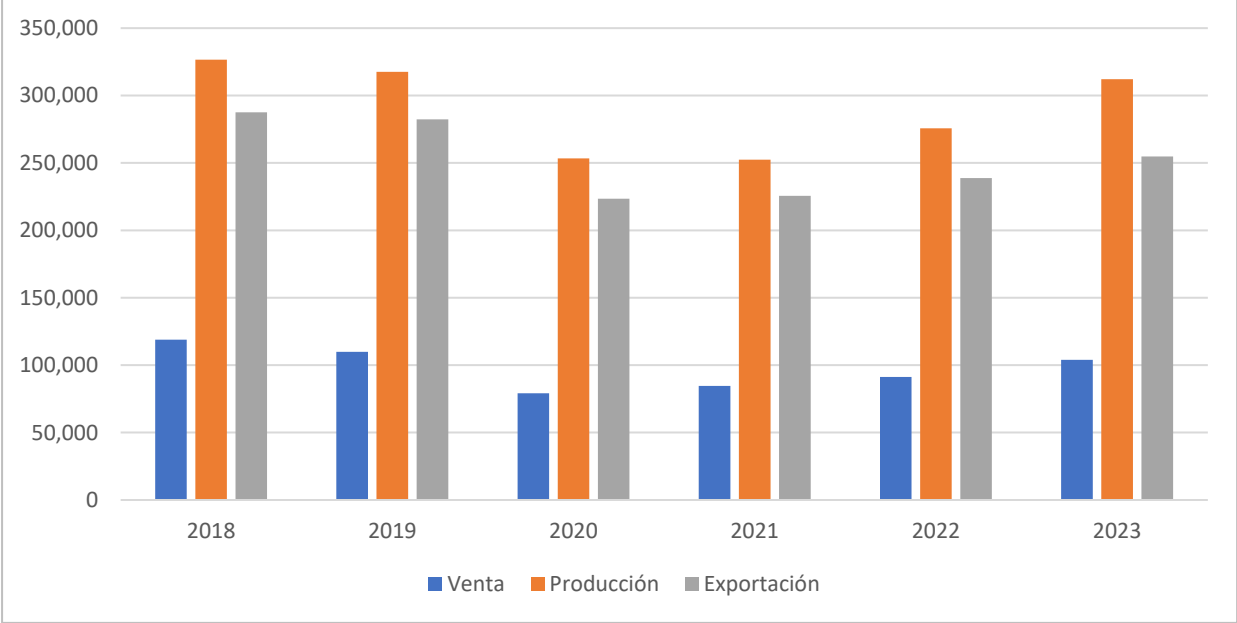
The work is structured in the following way. After the introduction, section one analyzes the performance of the IAM within the treaty through exports, production, and sales of light and heavy vehicles. Section two describes the evolution of minimum wages in Mexico. Section 3 details the methodology used in this research. Section 4 shows the evolution of salaries in AI 3 years after the celebration of the T-MEC. Finally, the conclusions close this investigation.

II. Panorama of the Automotive Industry in Mexico

The IAM has a crucial role for the economy, as it is a destination of interest for the main automakers, in addition to the growing expansion of auto parts producing companies according to Hernández Calvario (2022). The IAM has developed enough to make it very competitive as it is in countries for example in Europe or even the United States of America, and Brazil. Mexico has been put in the eyes of large investors, as a potential country for the implementation of vehicle plants and to continue growing, Mexico can position itself among the first producers of cars and auto parts worldwide, bringing with it economic growth and development, because the automotive industry is one of the main industries with the highest contribution to GDP.

In recent years, the IAM has experienced stable growth, the production of light vehicles registered a noticeable drop, going from 326,550 in 2018 to 317,589 vehicles in 2019, that is, a difference of only 8,961 vehicles (see Graph 1). From the above, Carbajal and Carbajal (2019) point out that Mexico presents a growth of close to 1% during the period, which is why it climbs one position to be in sixth place as a global vehicle producer, displacing South Korea, who until 2017 held that position.

Graph 1. Sales, production, and export of light vehicles, 2018-2023.

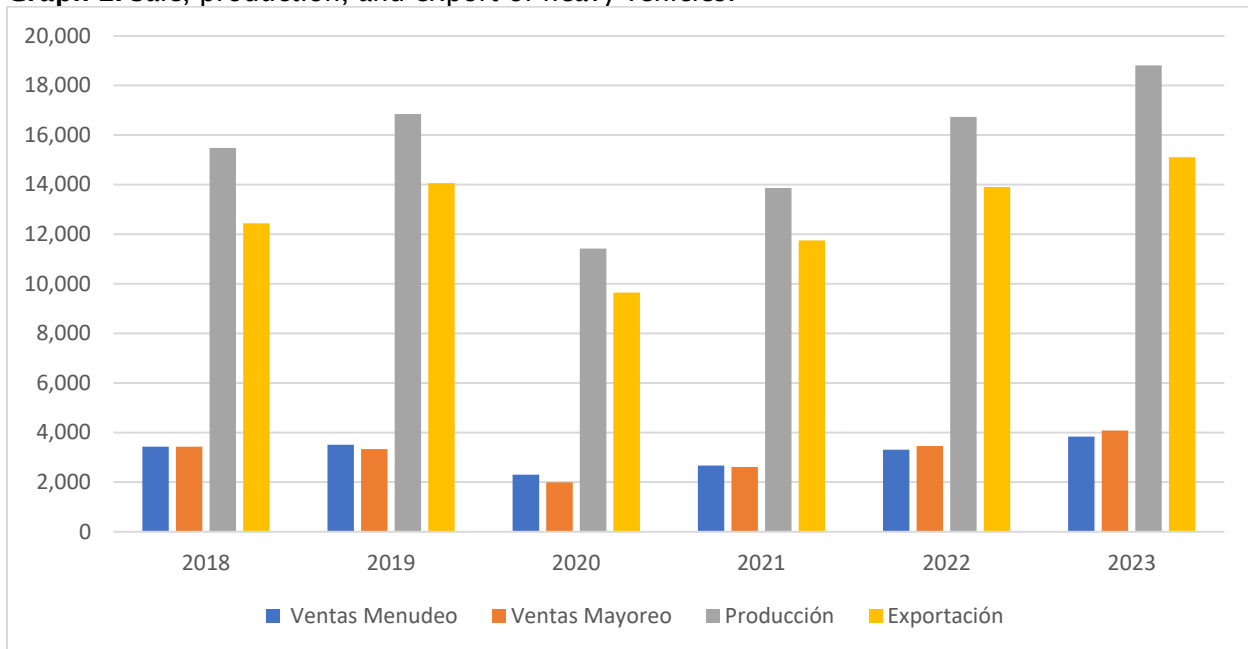


Note: Own elaboration based on INEGI (2023).

For 2020, a more pronounced drop is observed compared to 2019 with a production of 253,348 vehicles and a difference of 64,241. What happened can be explained by the pandemic and the great confinement that limited vehicle production. After July 2020, the entry into force of the renegotiation of the T-MEC, a clear improvement in production is noted in the years 2021 and 2022 with respectively 252, 373 and 275,696. By May 2023, there are 312,186 cars produced. This situation is observed in the other variables. Sales and exports, decline during the pandemic and recovery with the renegotiation of the T-MEC. The above allows us to conclude that production, sales, and exports grew after Mexico entered the new treaty with the neighboring countries to the north.

According to Graph 2, the production of heavy vehicles registered a considerable drop, going from 16,846 in 2019 to 11,423 vehicles in 2020, that is, a difference of 5,423. What happened can be explained by the pandemic and the great confinement that limited vehicle production. After July 2020, the entry into force of the renegotiation of the T-MEC, a clear improvement in production is noted in the years 2021 and 2022 with respectively 13,866 and 16,730. By May 2023, there are 18,810 cars produced. This situation is observed in the other variables. Sales and exports, decline during the pandemic and recovery with the renegotiation of the T-MEC. The above allows us to conclude that production, sales, and exports grew after Mexico entered the new treaty with the neighboring countries to the north.

Graph 2. Sale, production, and export of heavy vehicles.



Note: Own elaboration based on INEGI (2023).

III. Evolution of Salary in Mexico

The salary is defined as “the remuneration that the employer must pay to the worker for his work (Art. 82); The minimum wage is conceived by our labor law as the lowest amount that the worker must receive in cash for the services provided in a workday and must be sufficient to satisfy the normal needs of a head of family in the material and social order, and cultural, as well as to provide compulsory education for children (Art. 90)” (Campos Aragón, 1995:152).

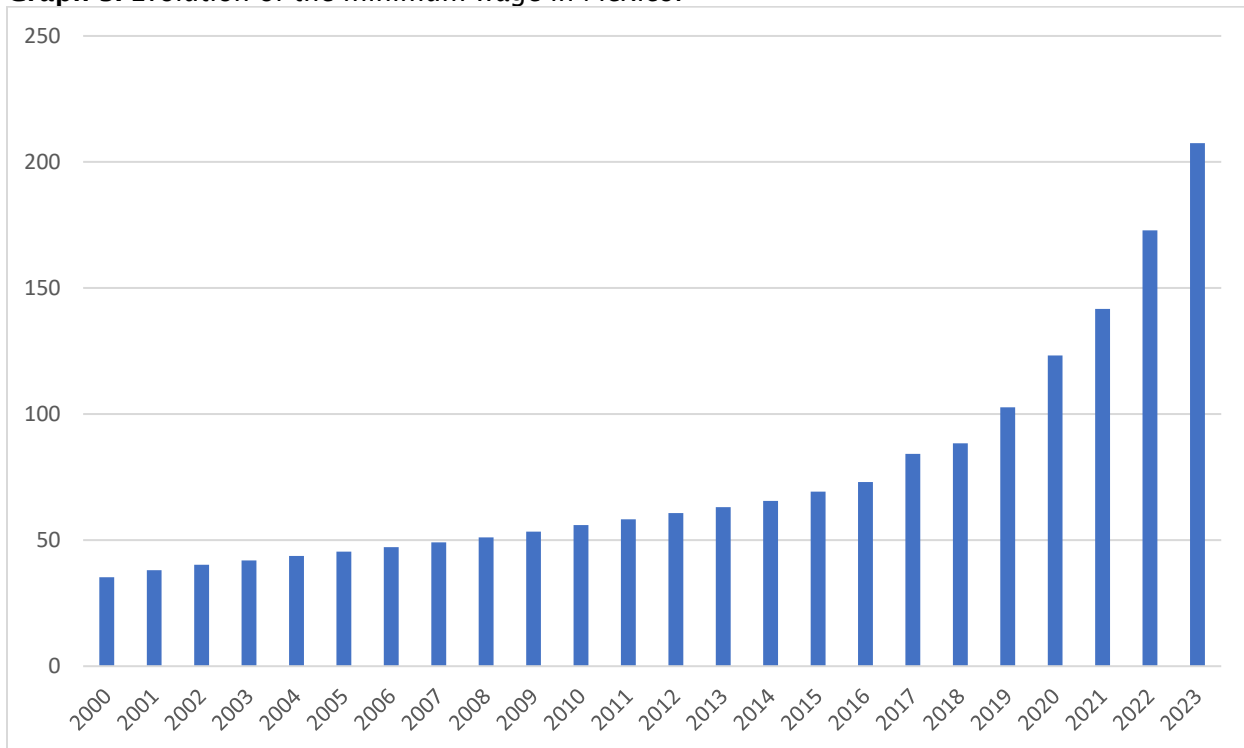
The IAM has had many changes throughout history, but Mexico is merely a vehicle assembly and exporting country, so having qualified and very poorly paid human capital is considered a potentially attractive country for foreign investment (FDI).). However, this idea does not always generate a competitive advantage. The greatest advantage that Mexico has in the T-MEC is its geographical location. This can be verified with the increases in sales, exports, and production levels. Also, at minimum wage levels.

Graph 3 shows the evolution of the minimum wage in Mexico, a growing trend is observed over almost 23 years, although insufficient according to Martínez González (2018). This has allowed for a better distribution of income, as Campos Vázquez and Rodas Milián (2020:51) point out: “the increases in the minimum wage are reflected practically one by one in the first five quantiles of the distribution. “Then, the minimum wage has an effect on the wage structure, on average, up to the 10th quantile of the distribution.”

Income redistribution is not the only advantage of wage increases. For Medina Sánchez (2018) there is a positive and significant relationship between labor productivity and salaries. However, although remunerations respond in the same sense to productivity levels, these increases are insufficient in accordance with the productive efficiency of the industry.

The salary participates in increasing the worker's productivity since it is a source of motivation and satisfaction. The importance of the income and perceptions of the working class in general, and of workers in particular in the automotive industry, in the growing productivity of the sector, level of exports and attraction of new capital as FDI in Mexico.

Graph 3. Evolution of the minimum wage in Mexico.



Note: National Minimum Wages Commission, 2023.

Now, García, Carrillo, and Bensusán (2022) state that:

Given the possibility that an automotive company installed in Mexico could be accused of social dumping if it does not respect the rules of the T-MEC and the internal regulations on freedom of association and negotiation, which require the representativeness of the unions and the support of the workers to collective bargaining, future negotiations could be expected to establish explicit criteria aimed at wage recovery.

These negotiations have given some results as Covarrubias comments (September 2022):

Average salaries in the IAM have evolved from 50 to 54.8 pesos per hour between 2019 and 2021. Annualizing for 2022, assembler salaries will close the year at 58.5 pesos per hour (2.9 dollars per hour). That is, the salaries of the terminal IAM have increased in the AMLO government - which is the one of the laboral reforms and the T-MEC era - by 0.30 dollars, or seen another way, by 0.10 cents per year. This is equal to an annual increase of 3.8% and a cumulative increase of 11.5%. Despite this effort, the wage differential between the Mexican industry and that of the United States and Canada has not been reduced in recent years.

The above allows us to strengthen the labor rights of workers in this sector. Now the worker can enjoy freedom of association. It is also hoped that the future wage balance between the three countries can ensure healthy competition within the industry. Finally, it is expected that this work will contribute to showing the areas of opportunity to strengthen the automotive sector in Mexico in the face of world powers such as Canada and the United States.

IV. Methodology

Design

The present work is based on a non-experimental design, the phenomenon observed within its natural environment is analyzed. Hypotheses are not tested. The purpose of this study is to analyze the evolution of salaries 3 years after the celebration of the T-MEC in the automotive sector of Mexico.

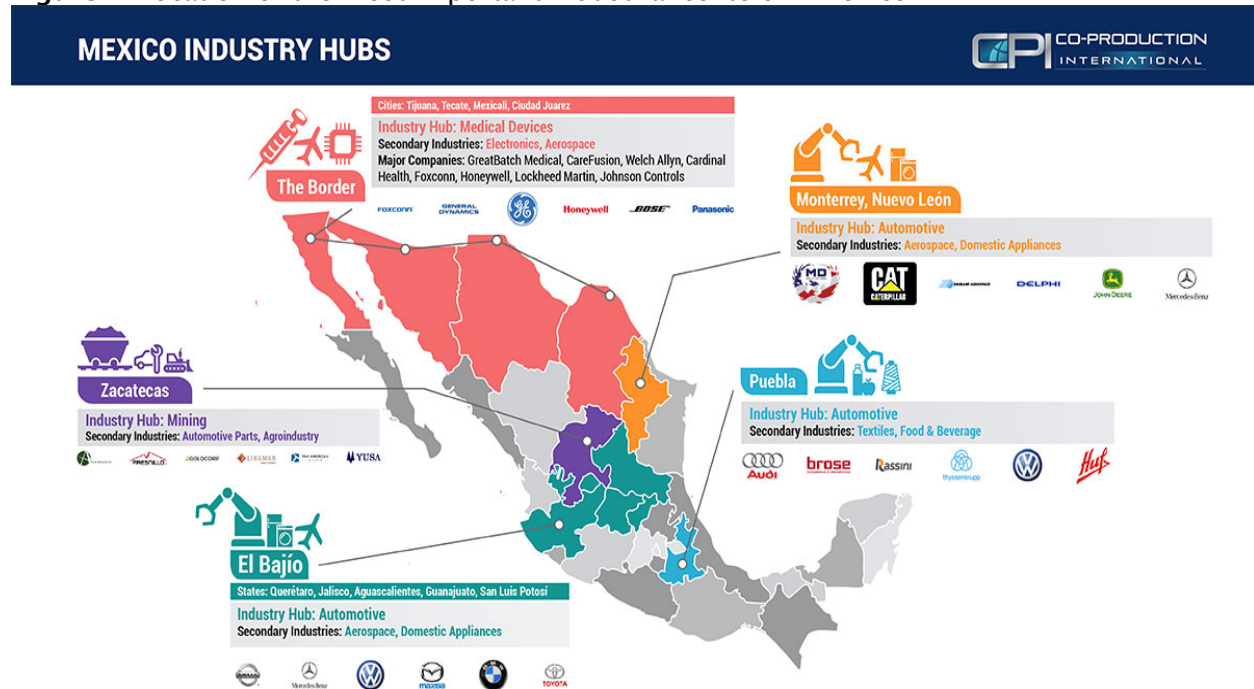
Tools

The study has a qualitative approach and a documentary data collection technique. This is articulated in the information obtained from files of any type, such as bibliographic (consultation of books) and periodicals (articles or essays in magazines and newspapers). In the case of this research, databases such as the National Institute of Statistics and Geographic (INEGI, 2023) will be consulted.

V. Results: Salaries in the Automotive Industry

The increase in salaries in the IAM has seen an evolution from the arrival of automotive plants in Mexico and the figures regarding production and export of vehicles in the country, as noted above. Furthermore, as can be seen in Figure 1, the geographical location of the country in combination with the tariff preferences that its exports have, as a result of the T-MEC, various automotive manufacturers to arrive and generate greater dynamism in the sector.

Figure 1. Location of the most important industrial centers in Mexico.



Note: Co Production International. What are the Top Locations for Automotive and Auto Parts Manufacturing in Mexico. Available at: <https://www.co-production.net/mexico-manufacturing-news/production-plant-location-strategy.html>

It is also worth noting that the increase in the minimum wage in the ranges observed from 2018 has represented an important finding since these increases have had an impact on those paid in various professional sectors. That is, the minimum wage has pushed or caused increases in the others earned by Mexican workers. This is known as the Lighthouse Effect (Marcelo Neri, 2001). In addition, it can also be stated that the increases tend to be smaller as the workers' salary level is higher (Kaplan, 2006).

Another factor that has contributed to the salary increase in the IAM is the arrival of various car manufacturers and their parts they have found in Mexico, a country with a growing economy. According to INEGI, the country registered an increase of 3.8% in the first quarter of 2023 (INEGI, 2023). This figure represents the recovery of the Mexican economy in relation to pre-pandemic levels and exceeds analysts' expectations regarding the evolution of the economic situation (Morales, 2023).

It should be noted that Mexico's geographical location has allowed various manufacturing industries to be located in the north-central part of the country. As can be seen in Figure 1, the arrival of various plants in the country is a trend that will continue to register another factor that allows us to predict that increases in vehicle production are the result of Mexican labor productivity and in this way, it is possible to expect that salaries continue their upward trend.

If we highlight that the country continues to have wages below what is stipulated by the T-MEC 16 dollars per hour, in the assembly of cars destined for export to the United States and Canada. However, we must start from the current salary situation in the country in the industry in question. To fulfill this purpose, it can be stated that the average salary is \$21,700.00 pesos per month; while the low and high ranges, respectively, are located at \$9,890.00 and \$61,800.00 pesos per month (Explorer, 2023).

Another aspect to highlight is the pace at which IAM salaries have increased, 5% in the last 18 months (Explorer, 2023). The world average for the same period is 3%. This means that, the Mexican economy and the automotive industry grow more on average, although it is not foreseeable that the country will pay 16 dollars per hour for the manufacture of cars that are exported to the United States and Canada, as established by the T-MEC. That is to say, that Mexico will fail to comply with this part of the treaty according to what was said by the director of the Mexican Association of the Automotive Industry.

The salary structure for different positions or positions in the IAM, on average, is the following for 2023:

Table 1. Average salaries in the automotive industry of Mexico, 2023.

Position	Monthly wage in pesos
After-sales manager	34,800
Alignment technician	11,400
Damage adjuster	13,200
Car detailer	12,900
Car parts manager	41,200
Assembly employee	13,000
Assembly manager	39,200
Car body repairer	12,200
Distributor Manager	55,100
Automotive electrician	14,500
Welder	10,400
Test engineer	21,900
Service Manager	38,200
Mechanic	12,500

Note: Own elaboration with data from Salaryexplorer.com

As can be seen in relation to the salaries presented in Table 1, and if they are compared with those paid in 2020, we have the following panorama:

Table 2. Comparison of salaries paid in some positions at the IAM in 2020 and 2023.

Position	Monthly wedge 2020 (MXN)	Monthly wedge 2023 (MXN)	Wedge per hour 2023 (USD)
Assembly manager	31,131	39,200	14.32
Automotive electrician	16,371	14,500	5.30
Test engineer	31,131	21,900	8.00
Car parts manager	33,240	41,200	15.05
Mechanic	17,364	12,500	4.56
Welder	15,130	10,400	3.80

Source: Own elaboration with data from Automotive Average Salaries 2020 and Salaryexplorer.com

It is worth noting that there is a distortion caused by the variation in the exchange rate used to calculate salaries in the selected years. In 2020, June, the exchange rate was 23.05 pesos per dollar while, currently, June 2023, the parity ranges between 17.10 and 17.15 pesos per dollar. Having clarified this point, we can affirm that salaries have grown less in operational positions; welder, automotive electrical or mechanic, compared to directives such as Assembly or Auto Parts Manager. That is, the salary increases have benefited those who already had a higher salary compared to workers and technicians.

The above illustrates two important things. The first, the IAM and its salary evolution presents a trend that favors social inequality since the income gap widens between command or managerial levels who have obtained more pronounced salary increases than the operational levels in automobile production, and two; None of the positions evaluated in Table 2 pay wages of \$16 per hour. The closest to this indicator corresponds to the Auto Parts Manager who earns \$15.05 dollars per hour. In Table 2, monthly payments are considered and divided by 160 hours corresponding to the average of 40 hours worked per week. The minimum amount required to comply with what the TMEC stipulates, with an exchange rate of \$17.10 pesos per dollar, is equivalent to \$2,188.00 pesos per day or \$65,664.00 pesos per month.

VI. Conclusions

Salaries constitute a source of motivation within organizations, so studying their dynamics is of great relevance. The renegotiation of the T-MEC opens the gap through the labor chapter for a substantial increase in salary levels in the automotive sector. With this idea, it is hoped to regulate wage levels between the countries involved in the treaty and avoid the social dumping that Mexico “applied” with respect to the other countries. So, the interest of this descriptive study is to analyze the evolution of salaries in the T-MEC, specifically, in the automotive sector.

The results show that, according to Covarrubias (September 2022), average salaries in the IAM have evolved from 50 to 54.8 pesos per hour between 2019 and 2021 and 58.5 pesos per hour (2.9 dollars per hour) in 2022. This is equal to an annual increase of 3.8% and a cumulative increase of 11.5%. Despite this effort, the wage differential between the Mexican industry and that of the United States and Canada has not been reduced in recent years. Therefore, it is convenient to highlight that Mexico continues to have wages below what is stipulated by the T-MEC, 16 dollars per hour, in the assembly of cars destined for export to the United States and Canada.

Now, the implications of the results presented indicate two scenarios: first, the IAM and its salary evolution present a trend that favors social inequality since the income gap widens between command or managerial levels who have obtained higher salary increases. pronounced than operating levels in automobile production, and two; None of the positions evaluated in Table 2

pay wages of \$16 per hour. The closest to this indicator corresponds to the Auto Parts Manager who earns \$15.05 dollars per hour.

Finally, three years after the entry into force of the T-MEC, salaries have increased in the automotive industry, but they have not reached \$16 per hour. It is expected that with a more detailed study, it can be determined in the first instance, given the growth detected, at what point in the future the figure of 16 dollars per hour could be reached. On the other hand, it is expected that, in future research, the indicators that directly affect the increase in salaries in the IAM will be determined, so that strategies can be proposed and applied to achieve the negotiated amount.

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Desarrollo de habilidades de los propietarios de las mypes de Nuevo Laredo aplicadas en el intercambio comercial internacional

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Resumen

El presente estudio realizado con el propósito de identificar el desarrollo de habilidades de los propietarios y administradores de las mypes enfocadas a la exportación productos artesanales en Nuevo Laredo, Tamaulipas, principalmente analizando las variables de solución de problemas, manejo de conflictos, comunicación, liderazgo, motivación y trabajo en equipo. El objetivo es determinar la importancia del desarrollo de las habilidades directivas y el impacto de la capacitación de los empleados de las microempresas.

En primer término la investigación se realizó una revisión de la literatura sobre la importancia del talento humano y el liderazgo de los administradores en la operación de las mypes. Para este fin se abordó los diferentes enfoques que se tienen sobre las destrezas directivas y cómo estas tiene efectos en sus empleados.

Posteriormente se definió el marco contextual de los microempresarios de la ciudad de Nuevo Laredo. Respecto a la metodología se usó el enfoque cuantitativo, de tipo exploratorio, descriptivo y correlacional. Se aplicó una encuesta, fue basada en parte en los reactivos diseñados por investigaciones previas desarrolladas por Red de Estudios Latinoamericanos RELAYN en esta ciudad fronteriza y se tomó en consideración en el estudio las características sociodemográficas de los participantes.

Por último se concluyó con los resultados del estudio y la discusión, donde se refleja cómo se rechazan las dos hipótesis planteadas en el estudio y se hacen comentarios al respecto.

Palabras clave: Capacitación; habilidades directivas; mypes; trabajo en equipo; liderazgo

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Análisis de la nomofobia entre estudiantes de ingeniería en tecnologías de la información: Prevalencia y factores asociados

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Resumen

La nomofobia, o "no-mobile-phone phobia", se refiere a la ansiedad o el miedo a estar sin el teléfono móvil o a no poder utilizarlo. La prevalencia de este desorden se ha incrementado en los últimos años y se ha asociado al bajo desempeño académico, el aislamiento, la depresión y la ansiedad. Por esta razón ha despertado un interés significativo en la comunidad científica, especialmente en el contexto universitario. El presente estudio analiza la prevalencia y los factores asociados a la nomofobia entre estudiantes universitarios de ingeniería en tecnologías de la información de una universidad estatal mexicana. Se condujo una investigación cuantitativa y transversal de alcance descriptivo-relacional en una muestra de 180 estudiantes universitarios de ingeniería en tecnologías de la información. Se administró el cuestionario NMPQ para evaluar los niveles de nomofobia. Adicionalmente se recopilaron datos sobre el comportamiento de los participantes con sus teléfonos móviles. Se realizaron pruebas de Chi-cuadrado y test exacto de Fisher para analizar la relación entre el nivel de nomofobia y los comportamientos reportados. Los resultados revelaron la presencia de nomofobia en niveles leve, moderado y severo entre los estudiantes de ingeniería en tecnologías de la información. Además, se encontraron relaciones significativas entre el nivel de nomofobia detectado por el cuestionario NMPQ y el uso del smartphone en clases, así como con la aparición de problemas musculoesqueléticos. También se observaron asociaciones significativas entre la nomofobia y el uso del teléfono inteligente en diversas situaciones cotidianas, como caminar, conversar, comer, ser pasajero en un vehículo y utilizar el dispositivo durante la noche antes de dormir. Los hallazgos apoyan la idea de que la nomofobia es un fenómeno relevante entre los estudiantes universitarios de ingeniería en tecnologías de la información. La dependencia excesiva del smartphone puede tener consecuencias negativas tanto a nivel físico, como a nivel social y académico. Estos resultados resaltan la necesidad de desarrollar estrategias de prevención y manejo de la nomofobia en esta población desde una perspectiva multidisciplinaria para mitigar los efectos negativos asociados al uso del smartphone y mejorar así el bienestar de los estudiantes universitarios.

Palabras clave: Nomofobia; educación superior; estudiantes

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Analysis of Nomophobia among Information Technology Engineering Students: Prevalence and Associated Factors

Abstract

Nomophobia, or "no-mobile-phone phobia", refers to the anxiety or fear of being without or unable to use a cell phone. The prevalence of this disorder has increased in recent years and has been associated with poor academic performance, isolation, depression, and anxiety. For this reason, it has generated significant interest in the scientific community, especially in the university context. The present study analyzes the prevalence and factors associated with nomophobia among undergraduate students of information technology engineering at a Mexican state university. A quantitative and cross-sectional descriptive-relational research was conducted in a sample of 180 university students of information technology engineering. The NMPQ questionnaire was administered to assess the level of nomophobia. Additionally, data were collected on the behavior of the participants regarding their cell phones. Chi-square tests and Fisher's exact tests were performed to analyze the relationship between the level of nomophobia and the reported behaviors. The results revealed the presence of nomophobia at mild, moderate, and severe levels among IT engineering students. In addition, significant relationships were found between the level of nomophobia detected by the NMPQ questionnaire and smartphone use in classes, as well as with the occurrence of musculoskeletal problems. Significant associations were also observed between nomophobia and smartphone use in various everyday situations, such as walking, conversation, eating, being a passenger in a vehicle, and using the device at night before going to sleep. The findings support the idea that nomophobia is a relevant phenomenon among undergraduate IT engineering students. Excessive dependence on the smartphone can have negative consequences physically, socially, and academically. These results highlight the need to develop prevention and management strategies for nomophobia in this population from a multidisciplinary perspective to mitigate the negative effects associated with smartphone use and improve the well-being of university students.

Keywords: Nomophobia; higher education; students

Factores predictores de la satisfacción y la lealtad del cliente en empresas de comida rápida en Nuevo Laredo, Tamaulipas

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Resumen

En la actualidad, los mercados de comida preparada están cada vez más saturados, dentro de ese sector las grandes cadenas de comida rápida mejor conocidas como Fast Food Restaurants (FFR) compiten con un mayor número de propuestas extranjeras o locales con modelos de negocio similares. Las numerosas opciones aumentan la competitividad, situación que obliga a las empresas a prestar servicios de alta calidad para mantener a sus clientes.

En nuestro caso de estudio, el sector restaurantero en la ciudad de Nuevo Laredo, Tamaulipas, continúa creciendo rápidamente. Los FFR ocupan un lugar importante en el gusto de muchos neolaredenses, por lo que resulta un mercado atractivo.

Por décadas las grandes marcas de las franquicias estadounidenses gozaron de la preferencia del consumidor local. La calidad de sus productos y servicios a través de procesos estandarizados y la atención al cliente, hasta ahora les ha garantizado la permanencia en el mercado. Sin embargo, aun cuando el objetivo de las empresas es mantener altos estándares de calidad del servicio, los clientes han manifestado inconformidades por distintos medios por ejemplo: reportan mal servicio en Mcdonald's en el periódico electrónico local (Niger, 2022); Dominos pizza y de Little Caesars. KFC tiene reportes de mala calidad de sus productos en Facebook además de reportes por contaminación del drenaje y del medio ambiente (Laredo, 2019).

Por lo anterior se considera importante el análisis de la calidad del servicio desde la percepción del cliente para conocer los factores más valorados por ellos para sentirse satisfechos y seguir comprando a una marca y hacer un boca a boca positivo.

El presente trabajo busca analizar si el nivel de calidad del servicio, el nivel de calidad de la comida, el precio y el nivel de seguridad por el COVID-19 son predictores significativos de satisfacción y la lealtad de clientes de FFR en la ciudad de Nuevo Laredo, Tamaulipas.

Para llevar a cabo este estudio, se aplicó una encuesta a 431 estudiantes del nivel superior que manifestaron ser clientes de algún FFR de la ciudad de Nuevo Laredo, Tamaulipas, México. Los datos fueron procesados y analizados con el paquete estadístico SPSS.

Entre los principales resultados se encontró que los consumidores de los FFR consideran en orden de importancia de más a menos: la calidad del servicio .948, la calidad de la comida .833, la seguridad en el COVID .680 y el precio .737 como importantes para la satisfacción .797 y la lealtad .869.

Se considera conveniente que los gerentes y administradores de los FFR de la ciudad de Nuevo Laredo, realicen las gestiones necesarias para mantener los niveles adecuados de estas variables en sus sucursales.

Palabras clave: Calidad del servicio; calidad de la comida; seguridad por la COVID; precio; satisfacción; lealtad

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Propuesta de reducción de tiempos de desplazamiento en el proceso de embotellado de garrafones de agua en empresa de bebidas purificadas

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Resumen

El presente proyecto muestra la implementación de un estudio de movimientos a través de técnicas estadísticas de una problemática sucediendo en una empresa de bebidas purificadas ubicada en la ciudad de Altamira, Tamaulipas, México, dicha empresa es la única empresa de bebidas que cuenta con operaciones, manufactura, distribución y mercadotecnia de bebidas carbonatadas y no carbonatadas, así como garrafones de agua en todo el territorio de México. Fue integrada en el año 2011, para brindar a los consumidores en México el poder de elegir entre un portafolio diverso de marcas para diferentes momentos y estilos de vida. Actualmente brinda empleo directo a más de 40,000 colaboradores, convirtiéndola en uno de los principales empleadores del sector privado en México.

El principal problema que se encuentra en la línea de abastecimiento de garrafones de la empresa es que no se cumple el tiempo ya establecido para llevar a cabo dicho proceso, esto debido a distintos factores que se analizan en el documento. El tener definidos todos los movimientos necesarios para cada tarea dentro de los procedimientos bajo una estandarización ayuda a solucionar esta problemática ya que brinda mejoras importantes en los tiempos del proceso y por lo tanto se incrementa la eficiencia y productividad en el área de traslado de garrafones, de ahí la importancia del análisis y estudio realizado.

Palabras clave: Integración empresarial; Optimización de procesos; Estandarización de procesos

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I. Introducción

Actualmente, la reducción de los tiempos de desplazamiento es fundamental para aumentar la productividad y reducir los costos operativos en la industria embotelladora de garrafones de agua. Este problema surge en un contexto en el que la demanda de agua embotellada sigue aumentando y la eficacia de la línea de producción es crucial para el éxito de las empresas.

Este proyecto se realizó en la planta de bebidas purificadas. La eficiencia en el proceso de abastecimiento es un factor crítico para la competitividad y rentabilidad en la empresa. Uno de los elementos clave en este proceso es el tiempo de desplazamiento, que juega un papel determinante en la agilidad y fluidez de la cadena de suministro.

El presente proyecto se centra en el análisis detallado y la posterior mejora de los tiempos de desplazamiento en el abastecimiento de garrafones vacíos, una fase esencial en la cadena de producción y distribución de agua purificada.

En el transcurso de este análisis, se abordan diversas metodologías y técnicas que permiten identificar puntos de mejora, así como la implementación de soluciones prácticas y medibles que optimicen el flujo de trabajo y contribuyan a la eficiencia operativa de la empresa.

Se trabaja con la línea principal de abastecimiento de agua para garrafones, que se enfoca principalmente en las temporadas altas de la empresa que comprende los meses de marzo a septiembre para alcanzar el 100% de eficiencia que quiere alcanzar la empresa.

Planteamiento del Problema

Actualmente, el proceso de transporte en la línea principal de abastecimiento de garrafones, tiene ciertos inconvenientes que son los factores climatológicos imprevistos, fallas en el montacargas, deficiencia en las rejillas de drenaje, fallas en la línea de agua, necesidades fisiológicas e interferencias de otros montacargas que compromete de manera directa o indirecta a la eficiencia y eficacia del proceso, que tiene un tiempo establecido de dos minutos con treinta segundos para alcanzar el cien por ciento de la eficiencia.

De acuerdo con los protocolos establecidos de la empresa, se implementa un proceso que consiste en que un operador utiliza un montacargas que transporta los Racks (Estructura que permite sostener garrafones) de garrafones vacíos a la zona de abastecimiento de agua y se toman los Racks ya reabastecidos con agua para ser trasladados al área de carga, cubriendo una distancia total de ciento cincuenta metros.

Sin embargo, el proceso de abastecimiento no está cumpliendo con el tiempo establecido que la empresa demanda, ya que hay una cierta variación en los tiempos de traslado de los Racks que pueden ir de cinco segundos a cerca de treinta segundos más a la operación, lo que implica un retraso significativo a la hora de repartir los garrafones de agua a los clientes.

Este incumplimiento de demanda afecta a la empresa perdiendo dinero, clientes y recursos, y lo más importante, que pierden la competencia con sus mayores rivales en el tema de consumo de agua purificada, reduciendo la confiabilidad y la reputación de la misma empresa.

II. Justificación

La implementación de una estrategia para la reducción del tiempo de desplazamiento en el proceso de embotellado de garrafones de agua es una estrategia clave para mejorar la eficiencia operativa, reducir costos, aumentar la calidad del producto y mantenerse competitivo en el mercado al mismo tiempo que se fomentan prácticas más sostenibles y responsables con el medio ambiente.

El transporte de garrafones en el proceso de abastecimiento de agua es una parte crítica para cumplir con el 100% de la demanda de producción de la empresa, ya que, si no se cumple, se pone en riesgo la satisfacción del cliente, lo que podría llevar a que decida cambiar de proveedor, por lo tanto, la reducción del tiempo de desplazamiento en el proceso de embotellado de garrafones de agua es una estrategia clave para mejorar la eficiencia operativa.

La reducción de tiempos y movimientos es importante para lograr el máximo de la eficiencia establecida por la empresa, reducir los tiempos de desplazamientos, lo cual permite un desplazamiento más rápido y efectivo en el proceso de garrafones vacíos.

III. Objetivo General

Reducir el 20% en los tiempos de desplazamiento de garrafones en la planta de producción, para diciembre 2023, teniendo una ganancia del 10% mayor a la ya establecida.

IV. Objetivos Específicos

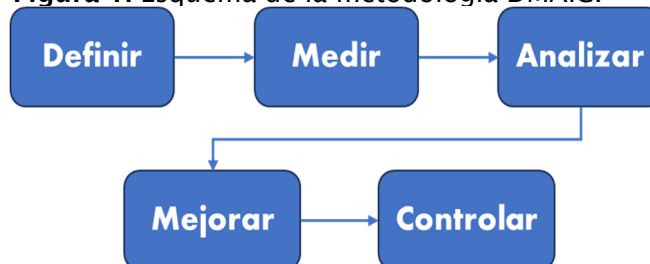
- Reducir el tiempo desplazamiento de traslado de garrafones vacíos.
- Mejorar el desempeño de los empleados.
- Cumplir con la demanda de producción.
- Estandarizar un nuevo tiempo límite.

V. Metodología Experimental

5.1 DMAIC

La metodología experimental abordada para el planteamiento de propuestas, de acuerdo con la problemática planteada, consiste en la metodología DMAIC, para desarrollar una solución para la empresa, para reducir tiempos de desplazamiento y consta en los siguientes pasos:

Figura 1: Esquema de la metodología DMAIC.



Nota: Elaborada por el equipo de alumnos de la Universidad del Noreste.

Fase 1: Definir

En esta fase se observa y se analiza cada uno de los procedimientos del proceso de abastecimiento de agua en garrafones, identificar los principales factores que retrasan el procedimiento y se reconoce el estado actual del proceso para tomar acciones correctivas.

Fase 2: Medir

Se realiza un proceso de medición de tiempos en el transporte de garrafones de agua en el área de producción de garrafones de agua, con esta herramienta se ayuda a identificar cuáles son los principales eventos que ocurren dentro del área de producción, lo cual nos permite conocer más a fondo su proceso.

Fase 3: Analizar

Se inicia con una fase de lluvia de ideas para identificar las posibles causas raíz de la problemática y proponer posibles soluciones para estas causas.

Fase 4: Mejorar

Se diseñan soluciones o mejoras basadas en el análisis de causas y efectos, con lo que se implementan las soluciones en un entorno piloto para evaluar su eficacia y realizar ajustes si es necesario para lograr el objetivo del proyecto.

Fase 5: Controlar

Mediante la propuesta a realizar, se logra manejar un programa piloto para obtener una muestra en base a la solución propuesta por el equipo en un periodo de tiempo corto para corroborar el éxito de este proyecto.

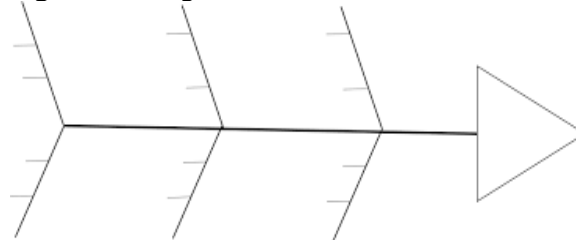
5.2 Ishikawa

El Diagrama de Ishikawa, también conocido como "Diagrama de Espina de Pescado" o "Diagrama de Causa y Efecto", es una herramienta gráfica utilizada para identificar, analizar y visualizar las posibles causas de un problema o efecto particular.

El ingeniero japonés Kaoru Ishikawa inventó esta técnica en la década de 1960 y se usa ampliamente en la gestión de la calidad y la mejora de procesos.

El análisis estructurado del Diagrama de Ishikawa proporciona un marco claro para la toma de decisiones estratégicas. Las organizaciones pueden asignar recursos de manera más eficiente y priorizar áreas específicas para intervención al clasificar las causas potenciales.

Figura 2: Diagrama de Ishikawa.



Nota: Elaborada por el equipo de alumnos de la Universidad del Noreste.

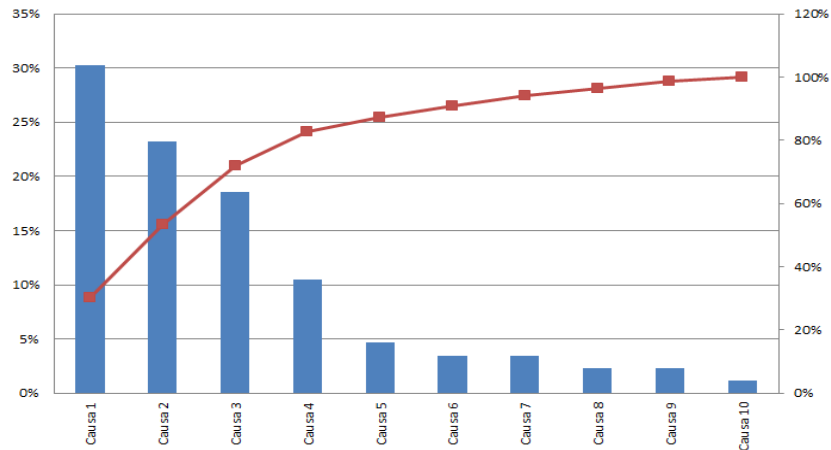
5.3 Pareto

El Principio de Pareto, también conocido como la regla del 80/20, es una idea fundamental que ha cambiado la forma en que las organizaciones abordan problemas y toman decisiones. Este principio, creado por el economista italiano Vilfredo Pareto a principios del siglo XX, se ha convertido en una herramienta vital para el análisis y optimización de los recursos en una variedad de contextos.

El diagrama de Pareto es una ilustración común del análisis de Pareto, que organiza los elementos en orden descendente según su contribución al problema o resultado. Este gráfico muestra una representación visual que destaca las áreas que necesitan más atención.

Este principio proporciona una guía valiosa para optimizar resultados con eficiencia, desde la planificación estratégica hasta la asignación de recursos y la toma de decisiones.

Figura 3: Diagrama de Pareto.



Nota. Elaborada por el equipo de alumnos de la Universidad del Noreste.

5.4 Análisis FODA

Tabla 1: FODA para el planteamiento de propuestas de mejora

<p>Fortalezas</p> <p>Estándares de eficiencia: La empresa tiene un compromiso con la eficiencia en el transporte de garrafones, lo que se refleja en su enfoque en la calidad del servicio.</p> <p>Personal capacitado: El personal de operadores de montacargas está debidamente capacitado y calificado para realizar sus tareas de manera efectiva.</p> <p>Calidad del producto: La empresa ofrece agua de alta calidad, lo que es una ventaja competitiva en el mercado.</p> <p>Infraestructura Modera: La empresa cuenta con una infraestructura tecnológica, montacargas y maquinaria de transporte para el proceso de los garrafones.</p>	<p>Oportunidades</p> <p>Mejora de procesos: Existe un amplio margen para mejorar la eficiencia en el traslado de garrafones, lo que podría conducir a una mayor satisfacción del cliente y ahorros operativos.</p> <p>Tecnología: La adopción de tecnología de seguimiento y programación de rutas podría optimizar el transporte de garrafones y reducir los tiempos de entrega.</p> <p>Desarrollo del mercado: La demanda de agua purificada está en aumento, lo que brinda oportunidades para expandir la base de clientes.</p>
<p>Debilidades</p> <p>Variables disruptivas: Las condiciones de mal funcionamiento del equipo y las interrupciones operativas de los operadores han demostrado ser obstáculos importantes para alcanzar los estándares de eficiencia.</p> <p>Poca Experiencia: Actualmente, no contamos con la experiencia suficiente para desarrollar este tipo de proyectos y puede tomarnos más tiempo de lo esperado.</p>	<p>Amenazas</p> <p>Regulación de las Leyes: Las leyes mexicanas tienen ciertos límites de velocidad de transporte dentro de una empresa que podrían afectar la operación.</p> <p>Dependencia del clima: Factores climáticos imprevistos pueden afectar de manera negativa el transporte de garrafones.</p>

Nota: Elaborada por el equipo de alumnos de la Universidad del Noreste.

VI. Resultados y Discusión

Fase 1: Definir

En base a lo anterior mencionado, se realizó una investigación a la empresa, dónde el área de producción de garrafones de agua es analizada e investigada, en dicha área se realizan una serie de actividades que son necesarias para la venta del producto, cabe recalcar que la parte importante del presente proyecto es en el proceso de transporte de garrafones de agua.

Posteriormente de elegir la empresa a estudiar, contactamos con el ingeniero encargado de las operaciones de la planta, con el objetivo de recolectar información, disponibilidad de los horarios y reglamentos de la propia empresa.

Fase 2: Medir

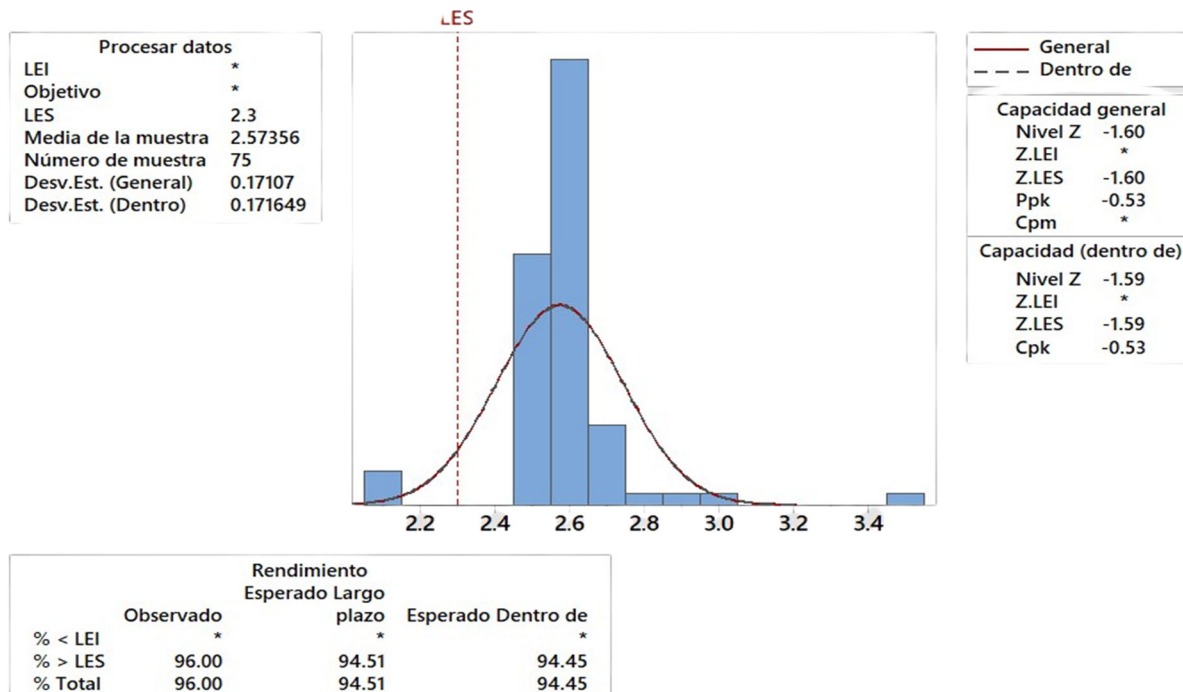
Dentro de esta etapa, se realizó un plan de recolección de datos, para evaluar la eficiencia y eficacia del proceso a mejorar, donde la información obtenida se utilizará para adentrarse en las posibles causas que están ligadas con el proceso de transporte de garrafones.

Con el permiso de la empresa, del gerente de planta e ingeniero a cargo, se tomó el tiempo del proceso de transporte en un periodo de 5 días de la semana, donde se logró obtener 75 datos de tiempos de transporte.

Fase 3: Analizar

Con la medición y recolección de datos, se logró obtener una muestra de 75 datos para nuestro estudio y análisis del proceso, con ayuda de la herramienta Minitab se hizo un informe en la capacidad del proceso como se muestra en la figura 4, para determinar si el proceso estaba controlado, y se demostró que hay una gran variación en los datos y el nivel de Z no es el adecuado, lo que provoca un proceso poco eficiente y eficaz.

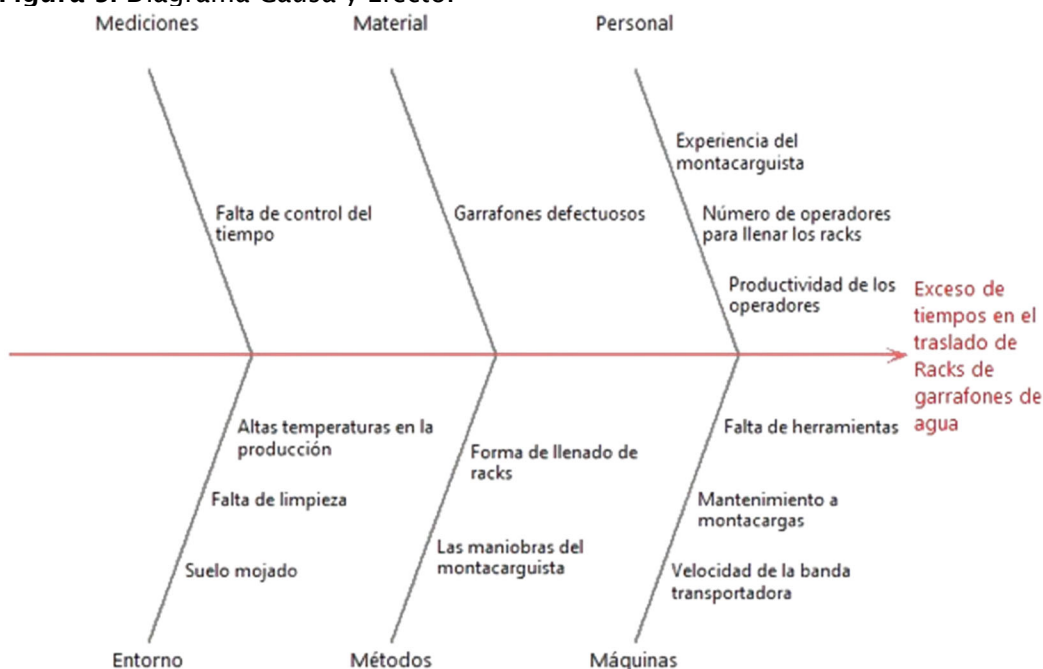
Figura 4: Gráfico de capacidad del proceso.



Nota: Elaborada por el equipo de alumnos de la Universidad del Noreste.

Posteriormente de analizar la capacidad de proceso, se realizó una serie de lluvia de ideas para identificar todas las posibles causas, mediante el diagrama de causa y efecto (Ishikawa) donde se colocaron las posibles causas que afectan al proceso como pueden ser por las mediciones, del material, del personal, del entorno, de los métodos y de la maquinaria como se muestra en la figura 5.

Figura 5: Diagrama Causa y Efecto.



Nota: Elaborada por el equipo de alumnos de la Universidad del Noreste.

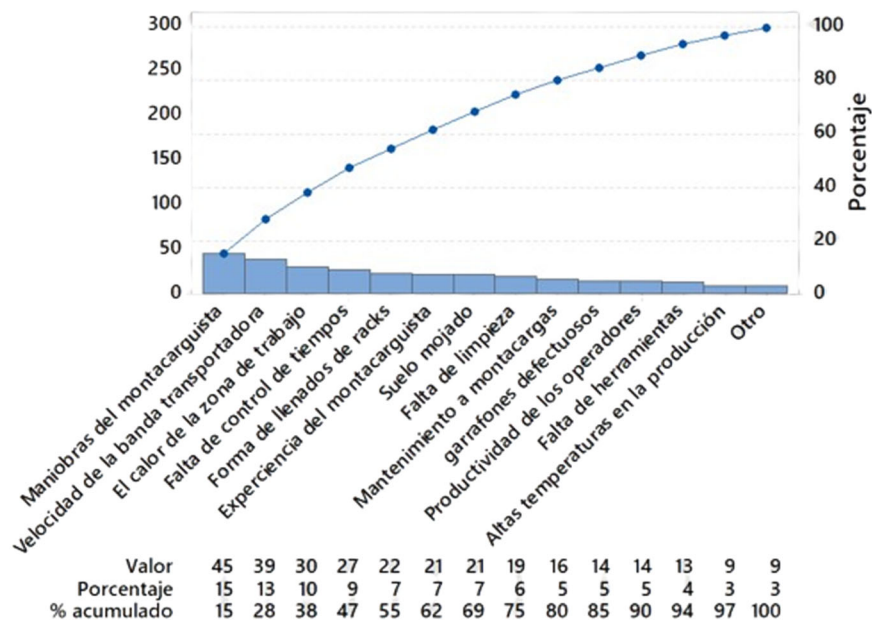
Mediante el diagrama de causa y efecto, se decidió realizar un diagrama Pareto para lograr identificar las principales causas que retrasan el proceso, se le dio a cada problemática un valor de nivel crítico en base a nuestro criterio como se muestra en la tabla 2 y figura 6, para atacar a las causas y buscar soluciones efectivas y con bajo costo.

Tabla 2: Tabla de Criterio.

X	Cesar	Mario	Juan	Mario	Bladimi	Total	Porcentaje
Maniobras del montacarguista	9	9	9	9	9	45	15%
Velocidad de la banda transportadora	9	6	6	9	9	39	13%
El calor de la zona de trabajo	9	3	3	6	9	30	10%
Falta de control de tiempos	6	3	9	3	6	27	9%
Forma de llenados de racks	6	1	6	3	6	22	7%
Experiencia del montacarguista	3	6	3	3	6	21	7%
Suelo mojado	6	3	3	6	3	21	7%
Falta de limpieza	1	6	6	3	3	19	6%
Mantenimiento a montacargas	3	1	6	3	3	16	5%
Productividad de los operadores	1	3	6	1	3	14	5%
garrafones defectuosos	1	3	6	3	1	14	5%
Falta de herramientas	1	1	9	1	1	13	4%
Altas temperaturas en la producción	1	1	3	1	3	9	3%
Número de operadores para llenar racks	1	3	3	1	1	9	3%

Nota: Elaborada por el equipo de alumnos de la Universidad del Noreste.

Figura 6: Diagrama de Pareto.
Diagrama de Pareto de Defectos



Nota: Elaborada por el equipo de alumnos de la Universidad del Noreste.

Fase 4: Mejorar

Con el análisis realizado en los pasos anteriores, se llegó a la conclusión que nuestras principales causas son las maniobras del montacarguista y la velocidad de la banda transportadora de garrafones, esto llevó a realizar una propuesta inicial que consiste en eliminar movimientos innecesarios del montacarguista y aumentar la velocidad de la banda transportadora de la línea principal de abastecimiento de agua en garrafones.

Para eliminar los movimientos innecesarios, se llegó a la propuesta de implementar una banda transportadora, donde se dejarán los racks vacíos y llenos de agua, con esto se podrían ahorrar 45 segundos del proceso de transporte de racks y eliminar tres movimientos que son el cambio de un rack vacío por uno lleno, con lo que en total se realizan siete movimientos para este proceso.

La propuesta se llevará a cabo con un programa piloto con una plataformas móviles que la empresa ya dispone para realizar la nueva muestra, y el cual se reducirá 40 segundos en total del proceso de transporte de garrafones, por lo que se lograría un tiempo nuevo estandarizado de 2 minutos lo cual tendría un beneficio significativo para la empresa, en base a esto, se le propondrá a la empresa invertir en nuevo material de transporte como se muestra en la figura 7, para que el nuevo proceso se logre implementar de forma permanente en la empresa.

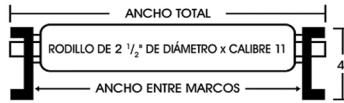
Figura 7: Banda transportadora.
Banda Transportadora de Rodillos por Gravedad Extraancho - 54" x 10'



Agrandar

Nueva tarimas pesadas y contenedores extraanchos en áreas de almacenamiento temporal y de ensamble.

- Marco de acero calibre 4 de uso superpesado.
- Rodillos de acero de giro libre mejoran la velocidad de empaque.
- 3" de distancia entre los centros de los rodillos.
- Conecte los marcos de acero para líneas más largas.
- Use con Soportes en H, se venden por separado.



Rodillos de 2 1/2" de Diámetro

* Capacidad basada en carga móvil distribuida uniformemente

MODELO NO.	ANCHO		LARGO DE SECCIÓN	CAP. DE MARCO* (LBS.)	PESO (LBS.)	PRECIO UNITARIO (MXN)		EN EXISTENCIA SE ENVÍA HOY
	TOTAL	ENTRE MARCOS				1	2+	
H-8823	54"	51"	10'	2,880	980	\$76,692	\$73,128	<input type="checkbox"/> AGREGAR

Nota: Información consultada por el equipo de alumnos de la Universidad del Noreste.

Figura 8: Implementación.

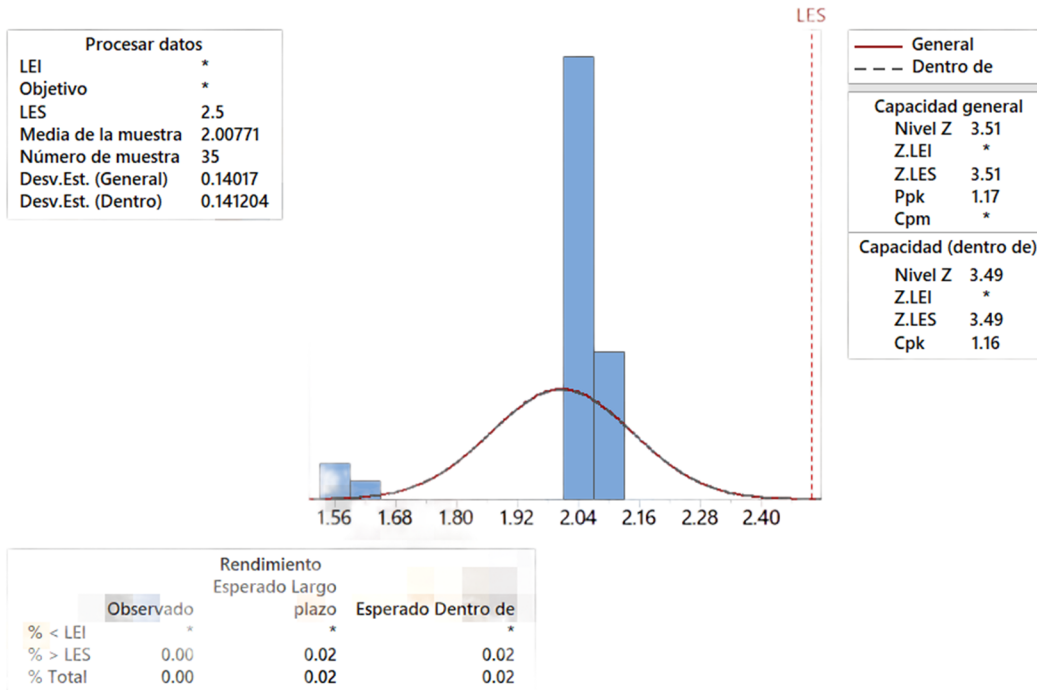


Nota: Fotografía dentro de la empresa por el equipo de alumnos de la Universidad del Noreste.

Fase 5: Controlar

Con base a la nueva muestra de datos obtenidos, se logró respaldar nuestra propuesta, ya que con solo unas plataformas se redujo el 20% del tiempo del proceso de transporte, con un nuevo tiempo promedio de 2.0077 minutos por recorrido, aumentando 2 racks para producción, logrando llegar a un nuevo tiempo estándar como se muestra en la figura 9.

Figura 9: Gráfico de la nueva capacidad del proceso.



Nota: Elaborada por el equipo de alumnos de la Universidad del Noreste.

VII. Análisis Financiero

Actualmente, el proceso cuenta con la siguiente información económica como se muestra en la tabla 3, la empresa anualmente genera \$123,002,880.00 pesos con el proceso actual sin ninguna mejora, lo que a pesar de que el proceso no está controlado, genera una gran ganancia.

Con el nuevo procedimiento, se llegó a una proyección a futuro con el nuevo procedimiento logrando llegar a incrementar 12% las ganancias anuales con \$14,192,640.00 pesos, que será un gran beneficio, ya solo se tendría que invertir en la banda transportadora que sería una inversión total de \$613,536 para cubrir 9 metros de largo para su funcionamiento, lo cual refleja un gasto mínimo en contra de las ganancias a generar.

Tabla 3: Tabla de Ventas.

Proceso Actual de la Empresa				
	Horas laboradas	Rack's producidos	Garrafrones producidos	Ventas de Garrafrones
Diario	8	208	8320	\$ 366,080.00
Semanal	56	1456	58240	\$ 2,562,560.00
Mensual	224	5824	232960	\$ 10,250,240.00
Anual	2688	69888	2795520	\$123,002,880.00

Nota: Elaborada por el equipo de alumnos de la Universidad del Noreste.

Tabla 4: Tabla de Ventas aproximadas con la propuesta.

Proceso Nuevo de la Empresa (Aproximado)				
	Horas laboradas	Rack's producidos	Garrafones producidos	Ventas de Garrafones
Diario	8	232	9280	\$ 408,320.00
Semanal	56	1624	64960	\$ 2,858,240.00
Mensual	224	6496	259840	\$ 11,432,960.00
Anual	2688	77952	3118080	\$137,195,520.00

Nota: Elaborada por el equipo de alumnos de la Universidad del Noreste.

VIII. Conclusiones

Uno de los principales retos a enfrentar fue disminuir los tiempos de traslado de garrafones, se consultaron varias propuestas para cumplir el objetivo, sin embargo, no todas eran convincentes del todo, por lo complicado que sería implementarlo, por consecuencia se volvió a repasar cada una de las ideas para implementar, lo cual nos basamos en propuestas sencillas para poderlo aplicar en un programa piloto y para que la empresa no tuviera que invertir una suma de dinero elevada, y una de nuestras mayores ventajas en este proyecto fue el conseguir los datos necesarios para aplicar una evaluación del proceso.

La propuesta de implementar una banda transportadora para el proceso de transporte de garrafones de agua, logró reducir el 20% de los tiempos de transporte a pesar de que en el programa piloto se llevó a cabo de forma rústica con la ayuda de unas plataformas movibles, y lo cual no solo se redujo el tiempo del transporte, también se redujo el 57% de los movimientos del montacarguista, en lugar de realizar 7 movimientos, ahora solo realizará 3 movimientos en todo el recorrido.

Esto no solo ayudará a reducir tiempos y movimientos, con base a los datos de producción de garrafones y en el precio de cada unidad, se llegó a la conclusión que se aumenta el 12% más a la producción, logrando opacar la posible inversión de la implementación de \$613,536.00 contra \$14,192,640.00 en ganancias anuales.

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Análisis de tiempos y movimientos para la optimización del proceso de transferencia en una planta petroquímica del corredor industrial en el sur de Tamaulipas

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Planta petroquímica del corredor industrial en el sur de Tamaulipas, Tampico, Tamaulipas, México

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Resumen

La empresa petroquímica en la cual se enfoca el presente proyecto es una empresa global de productos químicos y plásticos, fabricante de resinas para diferentes fines electrodomésticos, automovilísticos, eléctricos, médicos, etc, con sede en el continente de Asia, la filial del presente estudio se encarga de crear resinas a base de monómeros para después utilizarlas añadiéndole compuestos que son establecidos por el cliente y entregar como producto final pellets de plástico. Dentro de dicha empresa, la transferencia de resinas hacia la siguiente área de tratamiento es a través de tolvas y tubería, en esta área existe la presencia de numerosas actividades y movimientos innecesarios y que no aportan valor a la producción, a esto añadiendo que por la carga de trabajo los operadores algunas veces no terminaban de realizar sus actividades.

El proyecto se llevó a cabo mediante un análisis de tiempos y movimientos para optimizar los procesos de transferencia de materias primas con el fin de reducir los tiempos improductivos y mejorar la eficiencia en el proceso de llenado de tolvas, que es crítico para la producción. Se utilizó la metodología DMAIC de Six Sigma, análisis causa y efecto, análisis causa raíz, análisis 5 porqué's, gráfico de Pareto, estudio de tiempos y movimientos y matriz de riesgos. La implementación de las propuestas reduce los tiempos improductivos, incrementando la eficiencia y productividad del proceso de llenado de tolvas y permitiendo que los operadores terminen en un turno sus actividades correspondientes.

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Palabras clave: Optimización de actividades; proceso; transferencia; tiempos; movimientos

I. Introducción

El presente proyecto está enfocado en el estudio del trabajo hecho con el respaldo de una destacada empresa en el sector petroquímico. Esta empresa, se especializa en la fabricación de resinas sintéticas para la industria automotriz, electrónica, médica, embalaje, constructora y aeroespacial.

En este proyecto se llevó a cabo el análisis del desempeño de los tiempos del proceso del vaciado de super sacos de resinas en el área de alimentación y transferencia. Estos procesos son cruciales para la operación de la empresa y son llevados a cabo por un operador por turno, con un total de 3 turnos por día. El objetivo principal radica en la implementación de mejoras en el proceso de alimentación de material para contribuir al continuo éxito del corporativo.

El procedimiento que se realiza durante la producción, consiste en proveer de distintos materiales a la siguiente estación de proceso mediante el vaciado (constante) de supersacos de material previamente preparado para su distribución a través de tolvas que están conectadas por un sistema de tubería que se encarga de repartir el material necesario para continuar la producción.

En la figura 1 se muestra un anexo al proceso.

La importancia de optimizar los procesos dentro del área de alimentación de materiales es la necesidad de aprovechar todos los recursos disponibles, sobre todo el tiempo, al momento de realizar procesos tan críticos como lo es la alimentación de materia prima para el procesamiento de resinas y otros materiales. Debido a que dicho proceso es crucial para la empresa, es indispensable un análisis para la mejora de tiempos y movimientos dentro del mismo.

Planteamiento del Problema

En el área de alimentación y transferencia de materias primas se ha identificado un problema crítico: durante el proceso de traslado de los super sacos de materia prima y su vaciado en las tolvas, el operador realiza numerosos movimientos y desplazamientos que podrían ser innecesarios y consumen mucho tiempo. Esta situación afecta la eficiencia, ya que los tiempos de operación se ven restringidos, impidiendo que los operadores terminen sus actividades. A esto se suma el hecho de que, debido a las cargas de trabajo, los operadores no tienen tiempo suficiente para registrar adecuadamente la información en el sistema.

Los trabajadores hacen la petición de un trabajador en tiempo extra para poder ayudarles a llevar a cabo sus actividades completas, debido a que comentan que en un turno no les es suficiente para terminar con las actividades por sí solos.

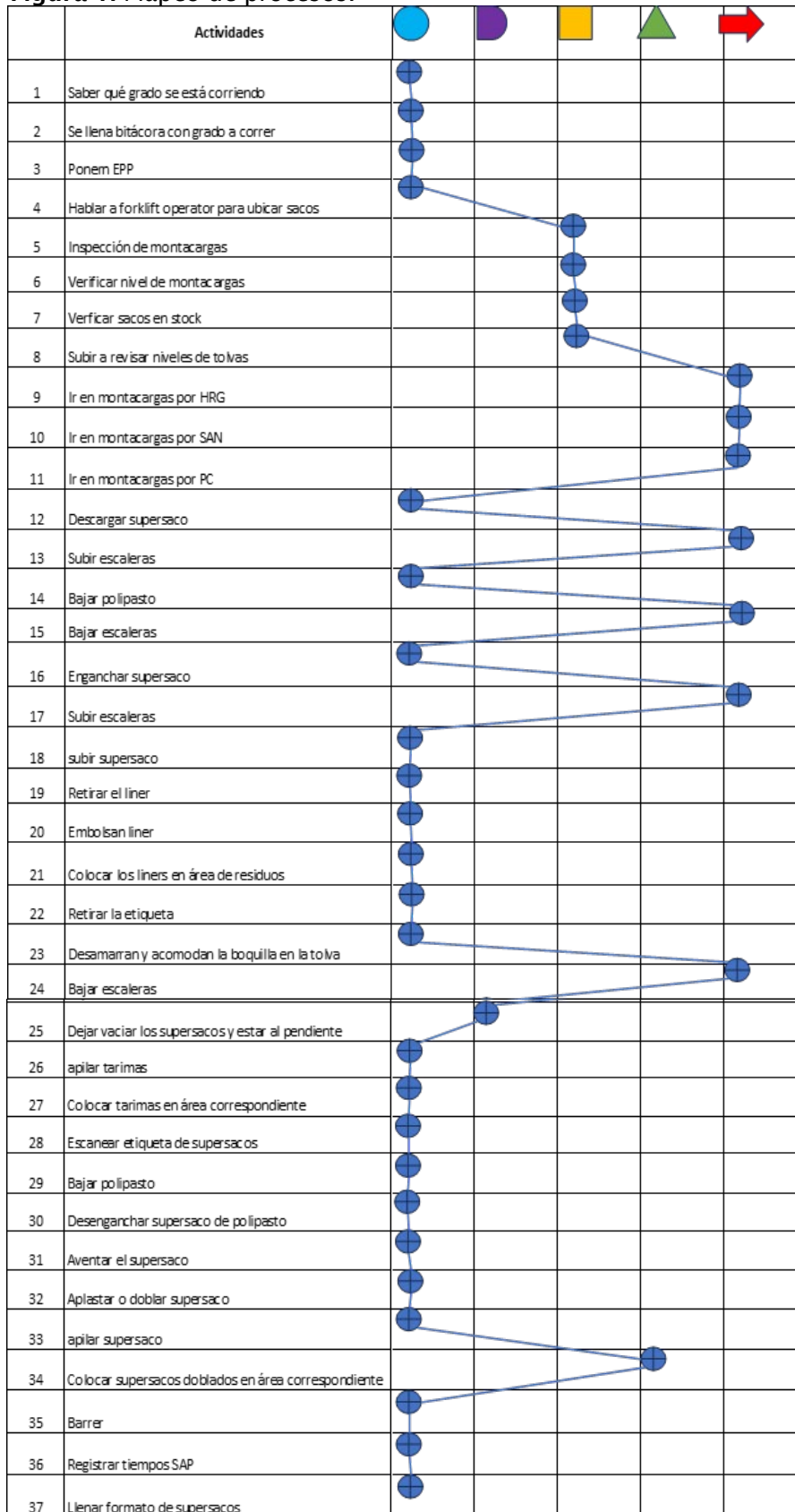
II. Justificación

Con las propuestas realizadas en el presente proyecto, se aprovecharía el tiempo ahorrado de manera más efectiva para utilizarlo en otros procesos que lo requieran, como el registro en sistema. Este enfoque es fundamental porque el proceso en cuestión juega un papel muy significativo para lograr la producción del producto más importante de la empresa.

En la actualidad, la logística de alimentación de tolvas y transporte de materiales pesados como los supersacos, presentan claras oportunidades para mejorar la eficiencia de la productividad del proceso. Al optimizar estas actividades y eliminar el tiempo improductivo, se activarán valiosos recursos disponibles que se podrán reasignar para mejorar otros aspectos del proceso de fabricación, como el tiempo de entrega y el espacio de llenado del sistema.

A través de la implementación de este proyecto, anticipamos un impacto significativo en la productividad general de la organización, siempre que las soluciones propuestas se apliquen correctamente, esto conducirá a capacidades operativas mejoradas, con una mayor flexibilidad,

Figura 1: Mapeo de procesos.



así como la capacidad de satisfacer mejor las necesidades de los clientes y, en última instancia, una mejor posición financiera a través de una gestión optimizada de recursos y reducción de costos.

III. Objetivo General

Proponer mejoras para el proceso de llenado de tolvas mediante el desarrollo de un estudio de métodos y tiempos permitiéndonos analizar las actividades empleadas en base de la metodología DMAIC en el área de alimentación y transferencia de la Empresa Petroquímica ubicada en el corredor industrial de Altamira, Tamaulipas, México.

IV. Objetivos Específicos

- Analizar y estudiar los tiempos y movimientos involucrados en el procedimiento de traslado y vaciado de supersacos mediante un estudio de métodos.
- Estudiar detalladamente los tiempos y movimientos dentro del procesos de vaciado de supersacos para identificar y atacar las áreas menos eficientes.
- Documentar de forma minuciosa el proceso, resaltando las áreas de oportunidad, así como avances y recomendaciones para mejorar el rendimiento operativo.
- Identificar y minimizar los tiempos muertos observados en el proceso, implementando soluciones que aumenten la productividad.

V. Metodología Experimental

Para llevar a cabo el análisis y mejora del proceso de llenado de tolvas se utilizó la metodología DMAIC de Six Sigma:

Definir: En esta parte se identifica el problema clave, y se establece el objetivo del proyecto. Se define nuestra meta que queremos que al final se cumpla, se mapea el proceso con un diagrama de flujo de todos los procedimientos que se llevan a cabo en el área.

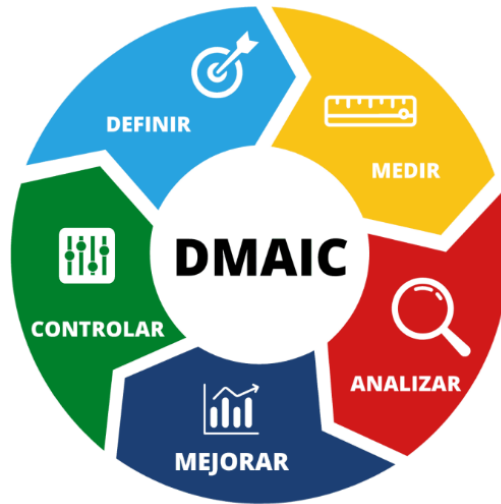
Medir: Se realiza un estudio de tiempos con cronómetro para registrar los tiempos de cada actividad del proceso actual, con base en los resultados se analiza la información y condiciones de cada actividad.

Analizar: Con base a los resultados se analizan los datos y la estadística devuelta, y se indagan cuáles son las causas de los tiempos más elevados analizando los porqués de los valores.

Mejorar: Se proponen mejoras en el proceso para eliminar y/o reducir actividades sin valor agregado.

Controlar: Con la implementación de las mejoras propuestas, se busca la manera de establecer las medidas y mantenerlas.

Figura 2: Herramienta metodológica DMAIC.



VI. Resultados y Discusión

Fase 1: Definir

Se identificó el problema clave, tiempos improductivos en el proceso, y se estableció el objetivo del proyecto. Se definió nuestra meta, se mapeó el proceso con un diagrama de flujo de todos los procesos que se llevan a cabo en el área (figura 1), se hizo una tabla de las partes interesadas, esto para poder identificar quiénes nos pueden ayudar y afectar en todo el proceso de nuestra certificación (figura 2). Se organizó la información en una carta del proyecto para partir de ahí y consultarla para recordar hacia dónde va dirigido el proyecto (figura 3).

Tabla 1: Análisis de partes interesadas.

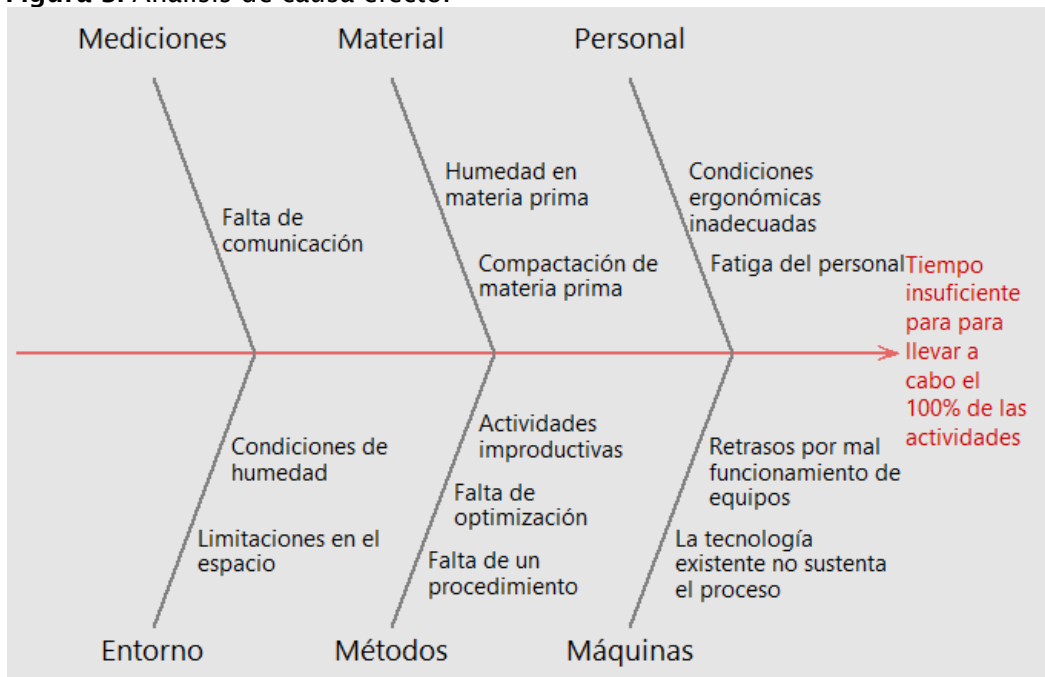
Alto	Influencia	Mantener satisfechos	Administrar de cerca
		Ing de operaciones	Pamela Carreño Supervisor de área Manager del área
Bajo	Influencia	Monitorear	Mantener informados
		Nóminas	Operadores de área
Interés			
		Bajo	Alto

Tabla 2: Carta de presentación del Proyecto.

Carta del proyecto			
Título	Análisis de tiempos y movimientos para la optimización en el proceso de transferencia en una planta petroquímica del corredor industrial en el sur de Tamaulipas	Supervisor	Ing Wendy Pensado
Necesidad de la empresa			
El negocio necesita que a los operadores les alcance el tiempo para registrar en sistema. Ya que los operadores dice que no les alcanza el tiempo por llevar a cabo las actividades del proceso.			
Alcance		Entregables	
Área de Alimentación y Transferencia		Eliminación de tiempos o actividades muertas en el proceso	
Riesgos		Dependencias	
Desinformación, cambio de estrategia de negocio, desconfianza del operador.		- Campaña de 3 materiales	
		- Tiempo de Ing. Wendy	
Cliente		Otros beneficios	
Empresa petroquímica		Operadores con mayor ergonomía y menos presión	
Gerente de área			

Se hizo un análisis causa efecto para definir las posibles variables que afectan a la problemática considerando mediciones, material, personal, entorno, métodos y máquinas, esto mediante la observación y análisis de la situación del área.

Figura 3: Análisis de causa efecto.



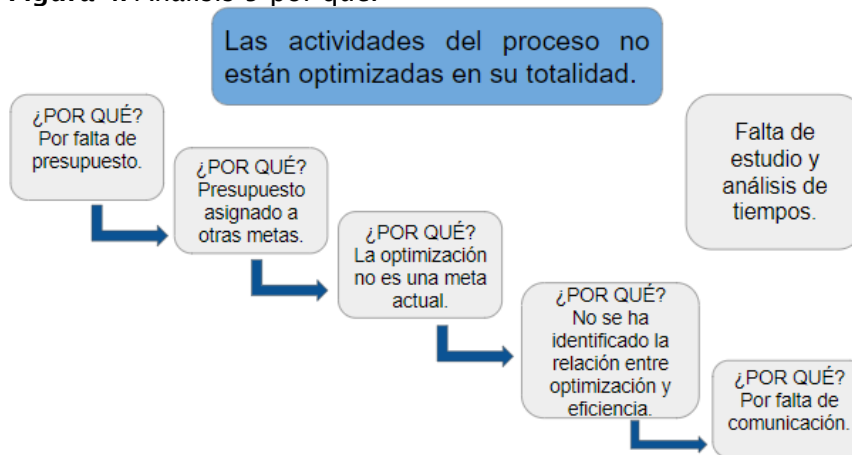
Según lo que observamos en el área y las opiniones del personal de área listamos las 3 variables más apegadas a la realidad de la problemática en un análisis de causa raíz para identificar la causa potencial en base a el estudio del proceso.

Tabla 3: Análisis de causa raíz.

	Variables	Causa potencial
Método	Las actividades del proceso no están optimizadas en su totalidad.	X
	Existencia de actividades improductivas en el proceso.	
Máquina-equipo	La tecnología existente no sistenta óptimamente el proceso.	

A lo que nos llevó a hacer un análisis de los 5 por qué's para buscar de dónde se origina la raíz de la problemática.

Figura 4: Análisis 5 por qué.



En el análisis llegamos a la conclusión de que hace falta comunicación entre los trabajadores del área, sin embargo, no tenemos acceso a la información de ese tema por lo que a nuestro criterio es una falta de estudio y análisis de tiempos.

Fase 2: Medir

Se realizó un estudio de tiempos con cronómetro para registrar los tiempos de cada actividad del proceso actual.

Fase 3: Analizar

Con base en los resultados se analizaron los datos y la estadística devuelta, y se buscaron cuáles son las que toman más tiempo y por qué. Después de haber tomado los tiempos y movimientos

Figura 5: Estudio de tiempos y movimientos.

N°	ACTIVITIES	OBSERVED TIME																																											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40				
1	Ir en montacargas por SAN	47	51	54	71	33	34																																						
2	Ir en montacargas por PC	70	45	57	56	57	59	220	70	72	129	66	74	60	63	21																													
3	Ir en montacargas por HRG	32	36	51	43	27	32	54	49	53	60	77	85	188	76	73																													
4	Subir escaleras	4	10	8	7	10	4	11	13	11	10	12	15	10	12	8	11	10	13																										
5	Bajar escaleras	6	5	8	7	8	7	5	5	8	7	8	7	9	5	10	7																												
6	Bajar polipasto	12	18	20	31	22	17	22	20	22	35	19	19	27	45	28	22	21	21	20	22	19	24	25	23	21	35	23	36	21	47	27	24	29	28	15	29	23	22	35	22				
7	Enganchar supersaco	22	31	23	22	20	27	30	36	29	25	27	23	22	24																														
8	Subir supersaco en polipasto	13	17	11	9	10	25	26	21	32	32	28	30	27	30	43	29	13	24	14	13	27	21	38	13	43	34	45	38	48	30	34													
9	Desamarrar y acomodar boquilla en tolva	18	21	23	46	24	16	22	17	21	27	23	36	27	26	21	25	17	22	20	18	40	21	28	27	24	27	43	23	26	25	32	24	23	31	32	22	24	20	31	50				
10	Apilar tarimas	47	36	45	25	20	34	47	27	22	25	30	24	49	31	24	31	35	22	21	40	27																							
11	Transportar tarimas en área correspondiente y regresar	13	12	29	13	20	14	18	7	9	16	11	21	25	11	14	26	22	15	26																									
12	Escanear etiquetas de supersacos	10	29	15	10	7	10	9	13	12	15	13	11	14	17	9	16	14	15	14	9	4	13	7	8	20	15	10	18	12	9	14	13	22	19	20	17	16	15	11	15				
13	Desenganchar supersaco	10	11	17	9	12	18																																						
14	Aplatar o doblar supersacos	20	89	38	114	30																																							
15	Transportar supersacos en área y regresa	81	40	71	178	160	110																																						
16	Limpiar el área	4	3	5	8	4	4	6	10	5	6	3	4	15	7	4	4	4	3	4	5	4	3	9	4	5	4	5	3	5	5	5	5	4	4	5	6	7	5	4	3				
17	Firmar en SAP	6	5																																										
18	Empujar y acomodar supersacos	15	24	14	24	21	15	17	18	35	29	17	40	26	24	22	25	16	12	27	15	13	16	18	21	20	33	21	33	21	18	31	12	24	18	36	34	40	22	18	32				
19	Sacudir supersaco	29	29	18	23	30	29	25	21	13	22	16	15	20																															
20	Tirar bolsa de supersaco	180																																											
21		12	245	265	49	14	666	137	187	120	242	178	140	41	940	20	70																												
22		1260	900	1429	1740	496																																							
23		110	130	10	17	90	18	12	22	30	57	26	97	26	49	13	13	10	33	24	12	36	27	47	52																				
24		6	7	16	10	14	8	16	25	6	4	9	3	6	7	16	9	13	12	10	9	10	13	11	18	6	38	16	6	5	18	19	24	8	14	9	7	4	9	14	4				
25		2	9	29	10	11	15	8	10	9	3	19	16	7	21	20	15	9	5	6	17	8	37	19	14	8	22	32	12	15															
26		8	22	32	12	15																																							

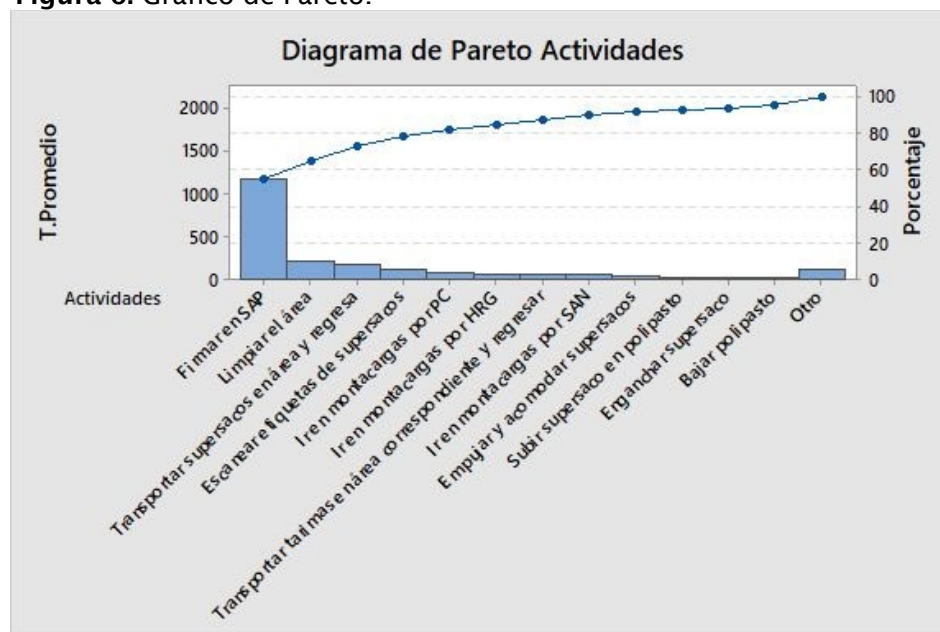
se analizaron los datos y se identificó cuáles toman más tiempo además de la naturaleza de cada acción y su tiempo promedio. En la tabla 4 listamos las actividades con sus promedios.

Tabla 4: Actividades con tiempo promedio.

ACTIVIDAD	PROMEDIO	ACTIVIDAD	PROMEDIO
Ir en montacargas por SAN	48.3 s	Transportar tarimas al área correspondiente y regresar	58.2 s
Ir en montacargas por PC	74.6 s	Escanear etiquetas de supersacos	106.7 s
Ir en montacargas por HRG	62.4 s	Desenganchar supersaco	5.1 s
Subir escaleras	9.9 s	Aplastar o doblar supersacos	22.8 s
Bajar escaleras	7.0 s	Transportar supersacos en área y regresa	180.0 s
Bajar polipasto	25.0 s	Limpiar el área	207.9 s
Enganchar supersaco	26.4 s	Firmar en SAP	1165.0 s
Subir supersaco en el polipasto	28.0 s	Empujar y acomodar supersacos	40.0 s
Desamarrar y acomodar boquilla en tolva	16.9 s	Sacudir supersaco	12.6 s
Apilar tarimas	13.4 s	Tirar bolsa de supersaco	17.8 s

En la tabla con promedios identificamos las actividades que más tiempo llevan y menos valor agregan a la transferencia de material, remarcamos con otro color las actividades sobre las cuáles fue posible proponer ya que por políticas y procedimientos no se podía proponer sobre cualquier actividad. Se graficó en un diagrama de Pareto los promedios obtenidos para poder visualizar en cuáles había mayor prioridad de enfoque, este se muestra en la figura 6.

Figura 6: Gráfico de Pareto.



En el gráfico se visualizan las actividades de mayor consumo de tiempo del trabajador, se remarcó con una flecha las actividades específicas sobre las cuáles fueron las propuestas, obteniendo un 10% de limpiar el área más un 9.5% de la suma de las actividades de apilar tarimas, sacudir supersaco y aplastar y doblar supersaco.

Se utilizó una matriz de riesgos para la calidad del producto -mostrada en la figura 7 -, acomodamos las actividades y analizamos el nivel riesgo que tiene cada una, así como su acción correctiva.

Figura 7: Matriz de riesgos.

Consecuencia						Valor del riesgo	Acciones
Probabilidad	Mínima 1	Menor 2	Moderada 3	Mayor 4	Máxima 5		
Muy alta	5	5	10	15	20	25	Aceptable Se vigilará aunque no requiere de medidas preventivas de partida.
Alta	4	4	8	12	16	20	
Media	3	3	6	9	12	15	Tolerable Se aplican medidas preventivas obligatorias, se deben controlar las variables de riesgo.
Baja	2	2	4	6	8	10	
Muy baja	1	1	2	3	4	5	Alto Requiere de medidas preventivas urgentes.

Proceso	Actividad	Causa	Consecuencia	Probabilidad	Impacto	Nivel de riesgo	Acción	
Limpiar el área	Barrer el área	Caída de materia prima al suelo	La ineficiencia en la gestión del tiempo y el uso de materia prima	5	2	10	Tolerable	No sacudir supersacos
	Sacudir superficie de tolvas	Caída de materia prima en la superficie de tolvas		5	3	15	Alto	
Aplastar y doblar supersacos	Aplastar supersacos	Evitar derrames de materia prima en el traslado a logística	Pérdida de tiempo	5	2	10	Tolerable	Optimizar proceso
	Doblar supersacos en dos			5	2	10	Tolerable	
Apilar tarimas	Agacharse para levantar tarima	Entrega de tarimas al área de logística	Pérdida de tiempo	5	2	10	Tolerable	Optimizar proceso
	Arrastrar tarima			5	2	10	Tolerable	
	Agacharse para cargar y colocar tarima			5	2	10	Tolerable	
Sacudir supersaco	Impacto de una herramienta manual sobre supersaco	Presencia de niveles elevados de humedad y compactación del producto	La ineficiencia en la gestión del tiempo y el uso de materia prima	5	4	20	Alto	No apilar supersacos en almacén
	Uso de polipasto con el fin de facilitar la descarga			5	4	20	Alto	
	Manipular y sacudir el supersaco suspendido			5	4	20	Alto	Erradicar humedad en el producto

Con base a esta matriz se obtuvieron 4 actividades con un nivel de riesgo alto por lo que necesitaban una acción inmediata, esto enfocó la atención en sacudir el supersaco sacudir la superficie de las tolvas además de planear propuestas que ayuden al objetivo principal, mientras se toman en cuenta los riesgos y estadísticos que se realizaron.

Fase 4: Mejorar

Se propusieron mejoras en el proceso para eliminar y/o reducir actividades sin valor agregado. En la actividad de limpiar el área se propuso una escoba de uso rudo que ayude al operador a

barrer de manera más rápida la resina que hay tirada en el suelo, el desglose de la propuesta se muestra en la tabla 5.

Tabla 5: Desglose de propuesta 1.

Limpiar el área			
Escoba de uso común		Escoba de uso rudo	
Tiempo actual	31 minutos	Tiempo mejorado	14 minutos
Costo	\$209 MXN	Costo	\$1,518 MXN
Duración	2 meses	Duración	1 año
	Valor de 1 hora	92.39 p/hora	
	Ahorro en tiempo	17 minutos (.28 hora)	
	Días de uso	365 días	
	Valor de tiempo anual ahorrado	$92.39 \times .28 \times 365 =$ \$9,442.25	
	Valor ahorrado anual neto	$\$9,442.25 - \$1,518 =$ \$7,924.25	

Figura 8: Escoba propuesta.

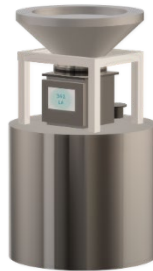


Para la segunda actividad que es sacudir el supersaco se propuso un embudo metálico para la boquilla de la tolva en el cual permite la entrada de más material y a su vez ayuda a que la resina no caiga en el suelo y beneficie también a reducir el tiempo empleado en barrer -la información detallada de la propuesta se encuentra en la tabla 6.

Tabla 6: Desglose de propuesta 2.

Sacudir supersaco			
Sin embudo		Embudo metálico	
Tiempo actual	10.2 minutos	Tiempo mejorado	0 minutos
Costo	\$0	Costo	\$10,000 MXN
Duración	-	Duración	20 años
	Valor de 1 hora	92.39 p/hora	
	Ahorro en tiempo	10.2 minutos (.17 hora)	
	Días de uso	365 días	
	Valor de tiempo anual ahorrado	$92.39 \times .17 \times 365 =$	\$6,592.81
	Valor ahorrado anual neto	$\$6,592.81 - \$4,500 =$	\$1,232.79

Figura 9: Boquilla de tolva con embudo propuesto.



Para la tercera actividad que consiste en aplastar y doblar el supersaco se propusieron dos herramientas, la primera consiste en un soporte para que el operador de pie tenga la oportunidad de doblar el supersaco y dejarlo reposando en el soporte, la segunda es una embaladora en donde se colocan los sacos y la máquina los aplasta, de manera que el operador los sacaría por cantidades mayores, estas dos herramientas les ayudarían a disminuir el tiempo que invierten en realizar el proceso manual en donde caminan por encima del supersaco, se agachan para doblarlo y caminan nuevamente para depositarlo en el área que los destinan -el detalle de esta propuesta se muestra en la tabla 7-. Las figuras 10 y 11 muestran el soporte y la embaladora.

Tabla 7: Desglose de propuesta 3.

Aplastar y doblar supersaco					
Sin herramientas		Soporte para supersacos		Embaladora hidráulica	
Tiempo actual	15.2 minutos	Tiempo mejorado	3.3 minutos	Tiempo mejorado	2.6 minutos
Costo	\$0	Costo	\$0	Costo	\$21,449.72 MXN
Duración	-	Duración	2 años	Duración	15 años
		Valor de 1 hora	92.39 p/hora		
		Ahorro en tiempo	9.3 minutos(.15 hora)		
		Días de uso	365 días		
		Valor de tiempo anual ahorrado	92.39 X .15 X 365 = \$5,058.35		
		Valor ahorrado anual neto	\$5,058.35 - \$1,429.280 = \$3,628.37		

Figura 10: Soporte para supersacos.



Figura 11: Embaladora hidráulica.



VII. Análisis Financiero

Con base en la información de cada propuesta, se cotizó el precio de cada herramienta y se calculó dependiendo su durabilidad el costo que habría que pagar por cada herramienta por año, sumado a eso se calculó en horas hombre el ahorro de tiempo del operador, acorde a una estimación del salario promedio del trabajador, se calculó el ahorro en dinero por el tiempo

reducido; a la ganancia que se calculó por dinero le restamos la inversión de la nueva herramienta y nos da como resultado el ahorro final por año de cada herramienta -la información detallada se muestra en la tabla 8.

Tabla 8: Resumen de ahorro por propuesta.

	Tiempo p/turno	Valor ahorrado p/año
Limpiar el área	17 minutos	\$7,924.25
Sacudir supersaco	10.2 minutos	\$1,232.79
Aplastar y doblar supersaco	9.3 minutos	\$3,628.37
	36.5 minutos	\$12,785.41

VIII. Conclusiones

El estudio de tiempos y movimientos efectuado en el proceso de transferencia de materia prima de la planta petroquímica permitió identificar ineficiencias e improductivas. Se detectaron actividades sin valor agregado que consumían más tiempo de los operadores, con las propuestas planteadas se elevaría la eficiencia y productividad al permitir que los trabajadores alcancen a terminar sus actividades en el turno laboral, además de generar un ahorro y tener un impacto positivo en la ergonomía de las actividades. La aplicación de la metodología DMAIC posibilitó un análisis detallado para determinar las causas raíz de las ineficiencias y proponer soluciones específicas, las mejoras se fundamentaron en los datos recabados y el análisis estadístico.

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